

Grundig Satellit 800 Millennium Sneak Preview

Volume 19, No. 5

May 2000

U.S. \$3.95

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Printed in the United States



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Vol. 19, No. 5

May 2000



Cover Story

Scanning Salt Lake City

By Jon Van Allen

Salt Lake City and Salt Lake County, Utah, have been totally reworking their communications systems to form more effective networks. So, whether you're a resident of the area or whether you're among the many visitors who come to the area for skiing, genealogical research, vacationing or on business, you'll appreciate this comprehensive communications profile.

Save this story and watch for updates as we get closer to the Winter 2002 Olympic Games to be held at Salt Lake City.

Story starts on page 10. Cover photo by Jon Van Allen KF7YN

VOA Special English..... 16

By Mark B. Lewis

Forty years ago, experts and diplomats were shocked and embarrassed when the VOA broadcast a 1-minute news program using what they called "baby English." With a vocabulary of only 1000 to 1500 words and slow delivery, this "insulting and demeaning" show is so popular with foreign audiences it now airs for a half hour and includes features which teach about American life, culture, and literature in addition to the news program.

Independence and Innovation at the VOA 19

By Mark B. Lewis

In pursuit of credibility, the VOA has long sought independence from the State Department. That independence was formalized last October. The author examines how the move has impacted the service and considers whether one of the VOA's most innovative programs, *Talk to America*, can maintain the credibility and appeal to overseas audiences won by the Special English broadcasts.

Museum for Monitors 22

By Leon Fletcher

"An interactive exhibition of the history of maritime communications" occupies the upper floors of the San Francisco Maritime Museum, which is located in a grand art-deco building two blocks west of the famous Fisherman's Wharf. This museum is an enjoyable stop on any visit to San Francisco, especially for families and for folks who like radio and ships.

Build this Budget FM-DX Antenna 25

By Ken Reitz

When you're digging for distant FM radio or television reception, coughing up the money for an expensive model may not be as good a solution as buying two cheaper ones – and stacking them! Here are some practical pointers for designing your own DX array.

Review:

See page 28 for a sneak Peek at the Grundig Satellit 800.

Bob Grove gives us our first glimpse of the long-awaited Grundig Satellit 800 Millennium receiver. Though not the final version, this preproduction model gives a reliable hands-on feel for what's in store for eager owners.



Other Reviews:

Sangean's new ATS 505 shortwave portable is very easy to operate and pleasant on the ears.

continued on page 4

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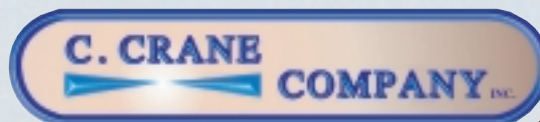
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MONITORING TIMES
(ISSN: 0889-5341;
Publishers Mail
Agreement #1253492)
is published monthly by
Grove Enterprises, Inc.,
Brasstown, North
Carolina, USA.

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Periodicals postage paid at Brasstown, NC,
and additional mailing offices. Short excerpts
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7540 Highway 64 West,
Brasstown, NC 28902-0098
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e-mail: mt@grove-ent.com
Editorial e-mail: mteditor@grove-ent.com
Subscriptions: order@grove-ent.com

Subscription Rates: \$24.95 in US; \$37.50
Canada; and \$56.50 foreign elsewhere, US
funds. Label indicates last issue of subscrip-
tion. **See page 107 for subscription
information.**

Postmaster:
Send address changes to *Monitoring Times*,
P.O. Box 98, Brasstown, NC 28902-0098.

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Reviews cont.

Check out the review by Wayne
Mishler on p.98. The Radio
Shack PRO-94 portable, dual
trunking scanner is a solid per-
former, but wait for a sale,
says Parnass (p.100).

Alinco has come up with
two new versions of its dual
band DJ-V5T handie talkie
that are guaranteed to appeal
to the younger set: the style is
“radical chic,” says Elliott.
See p.96.

How well does digital sig-
nal processing (DSP) work to eliminate



noise and interference?
Catalano checks out two DSP
programs: the Swezey Digi-
tal Filter and GNASP1 – one
is inexpensive and the other
is free (p. 94)!

What equipment do you
need for GOES reception?
Lawrence Harris reviews an
active feed and downconverter
by Timestep Weather Satellite
Systems, retailed by Swagur
Enterprises.

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Radio Frequencies to Become a Commodity

"...radical overhaul of the rules governing one of the most valuable, if intangible, forms of property in the new economy..."

The concept of public airwaves – at least for some frequencies – may be over! Radio frequencies are planned to become commodities that can be bought, sold and rented ...like pork bellies, cattle, soybeans and winter wheat.

The *New York Times* reported on March 13th that the FCC is working on a system under which holders of unused or underused commercial radio frequencies will be able to offer them to other firms. The new planned rules would create a spectrum trading system in which telecommunications companies of all kinds could bid for underused slivers of the spectrum that are already under the control of other companies.

Under the current system, the federal government licenses users and determines which frequencies, signal power and purpose they can use. Older licenses were not auctioned – instead they were given away through a comparative selection system or by lottery. More recently, radio frequencies were sold by the Government to the highest bidder. Licensees have never been able to sell or offer their frequencies to others. That apparently will change.

The FCC is concerned that, since the demand for radio frequencies far outstrips supply, new wireless services may be prevented from coming to market. Internet traffic is increasing dramatically, much of it through new and planned wireless devices and handheld computers. FCC Chairman Bill Kennard says it would be a tragedy if the migration of the Internet to inexpensive wireless hand-held devices was prevented by the lack of radio spectrum.

The *Times* said that in deregulating the spectrum to create the new spectrum market, the FCC would permit holders of airwave slices to profit from any surplus frequencies by offering them to others to use for periods when they are not needed.

♦ "Guard Band Managers" - A new class of FCC license

The move to deregulate radio spectrum assignment has now begun. In the *Balanced Budget Act of 1997*, Congress directed the FCC to

reallocate spectrum in the 700 MHz band to commercial and public safety (police, fire, etc.) uses from its previous exclusive use for television broadcasting service on channels 6069. A total of 36 MHz was allocated for commercial uses.

In a January 6, 2000, *Report and Order*, the FCC adopted service rules for 30 MHz of this spectrum. At that time, the FCC designated the remaining 6 megahertz as Guard Band spectrum consisting of two paired bands, one of 4 megahertz and one of 2 megahertz.

On March 8th, the FCC adopted new licensing and service rules governing the operation of these guard bands, established to protect public safety services that operate within the 700 MHz band from any harmful interference from adjacent commercial users. The FCC said public safety licensees should experience no greater interference risk from Guard Band users than from other public safety licensees.

The FCC proposes to auction the spectrum in two blocks, one of 4 MHz and the other of 2 MHz. Those who obtain rights to the spectrum are deemed "guard band managers" (GBMs). [*We think Radio Frequency Spectrum Brokers would be a better name!*] Guard Band Managers will be required to adhere to strict frequency coordination and interference rules, and to control use of the spectrum so as to facilitate protection for public safety.

Guard Band Managers will be engaged in the business of subdividing the radio frequency spectrum they acquire at auction and leasing it to third parties.

Guard Band Manager licensees have many potential benefits, including: (1) Guard Band Managers will provide for market-based transactions in wireless capacity at a time when access to spectrum is a critical need for a wide variety of wireless operations; (2) spectrum users will have more flexibility in obtaining access to the amount of spectrum, in terms of quantity, length of time, and geographic area, that best suits their needs; (3) development of a "free market" in spectrum could result in more efficient use of this limited resource; (4) this licensing approach will streamline the day to day management of this spectrum, and many spectrum-

related functions now carried out by the FCC in other bands will be handled by Guard Band Managers in this band.

The Guard Band Manager may subdivide its spectrum in any manner it chooses and make it available to system operators or directly to end users for fixed or mobile communications, consistent with the frequency coordination and interference rules specified for these bands.

This licensing represents an innovative spectrum management approach that should enable parties to more readily acquire spectrum for varied uses, while streamlining the Commission's spectrum management responsibilities. The guard band order is a forerunner to FCC Chairman Kennard's plan to revise the FCC rules to allow for spectrum to be "commoditized."

♦ Software Defined Radio

In a Notice of Inquiry issued on March 17th, the FCC asked for public comment on a new generation of radio equipment under development that can be quickly reprogrammed to transmit and receive on any frequency within a wide range using virtually any transmission format. This programming capability could allow a single device to transmit in the various cellular, PCS and other wireless services used in the U.S. and worldwide.

"Software defined radio" (SDR), first demonstrated in a Department of Defense project in 1995, has the potential to promote more efficient use of spectrum, expand access to broadband communications for all persons and increase competition among telecommunications providers. The Commission sought comment on how SDR technology could affect a number of Commission functions in the future, including spectrum allocation, spectrum assignment and equipment approval.

FCC Chairman Bill Kennard said "...we are running out of spectrum. One way to head off a spectrum drought is to make sure that the spectrum that we have licensed is always in use. Software defined radios are smart devices that can make good use of underused spectrum. They can operate as a cell phone one minute, a PCS phone the next, a taxi dispatch radio later on and a two-way pager after that."

NEWS AND VIEWS FROM OUR READERS

Real-life radio shack

“I try to be neat, but then find some things that need to be changed, and that has gone on for 40 years. Just as soon as I get thing *final-*

- Carl Nay K8VOG, Bettsville, OH

In the March issue of Letters we asked “why does no one use 155.475? Has everyone moved to UHF?” Well, it appears a lot of communities do still use it. Thanks to all the great responses we got to our query! Here they are:

"In regards to the question 'what has happened with 155.475,' it is in use here in Minnesota. I live in the southern part of MN and this frequency is used by all of the law enforcement agencies in MN and Iowa as a common statewide freq. Basically it is used if several different agencies have a need to communicate on a common frequency such as during a high speed chase or when different agencies such as a police department wishes to communicate with a fire department. It is known here as a mutual aid channel.

– *Bob Schultz, KC0FBB, St Louis Park, MN*

“As a listener, I can say that 155.47 has been very commonly used all over the Northeast Ohio area for interagency law enforcement use. Now that I live in Southwest Ohio, I still hear it being used, most often by the Indiana State Police issuing ‘Be On Lookout’ bulletins.”

$\begin{matrix} \sim 0 & 0 \\ - \setminus < , - \setminus < , \\ (*) / - - - | / - (*) \end{matrix}$
 Judy May -
 tandembike@worldnet.att.net
 Life is a journey ... Enjoy the ride!

“Concerning 155.4750 ... All the IRS, ATF, USC, USCG, DEA, DOE, USFS-LE, USSS al-

- continued on page 97



7

VOA Discrimination Suit Settled

The sex discrimination suit brought against the VOA and the US Information Agency 23 years ago is finally close to settlement. The Justice Department has agreed to pay over \$508 million to settle the suit after fighting the suit at every turn.

The class action lawsuit was brought against those agencies by roughly 1,100 women contending they were denied jobs as international radio broadcasters, technicians, writer/editors and production specialists between 1974 and 1984. A federal judge ruled in 1984 that the VOA had indeed discriminated in its hiring practices, but for the next 16 years the Justice Department unsuccessful appeals.

Lawyer Bruce Fredrickson praised the Justice Department for its courage, but said the case could have been settled for much less years ago. The Department agreed to pay \$23 million to about 50 women whose claims were decided individually, an additional \$508 million to settle the remaining claims, plus pay the plaintiffs' attorneys! The settlement will not be final until class action members have a chance to review the pact.

US Appeals Court Upholds RF Exposure Regulations

The US Court of Appeals for the Second Circuit has upheld the FCC's 1996 RF exposure guidelines. It's particularly significant inasmuch as the court also turned away a challenge to the FCC's exclusive ability to regulate relevant radio facility operations. The challenge was brought by the Cellular Phone Communications Workers of America.

The petitioners, in part, had claimed the FCC failed to account for non-thermal effects of RF radiation, didn't evaluate new evidence, failed to get expert testimony, and failed to account for "scientific uncertainty" about RF exposure in deciding to not lower the maximum permissible exposure levels below the maximum permitted thermal levels. The petitioners also faulted the FCC for adopting a two-tiered system that allows for higher exposure in "occupational/controlled" situations than in "general population/uncontrolled" situations.

In an opinion released February 18, the three-judge panel upheld the FCC against the challenges on all points. The Appeals Court also rejected arguments that the FCC did not enjoy broad preemption authority over state or local government under the Telecommunications Act of 1996 to regulate wireless service facilities.

The FCC's rules on RF exposure apply to transmissions by amateur radio operators as well as commercial broadcasting and communications. Amateur Radio Relay League RF Safety Committee Chairman Greg Lapin, N9GL, credits the FCC with being comprehensive in devel-

oping its RF safety regulations and thinks the Appeals Court did the right thing.

Merlin Gets the Business

Merlin Communications was formed in March 1997, following the UK government's decision to privatize the BBC's transmission networks. Although Merlin's own Network One hasn't been a financial success, a number of other entities have announced plans to use transmitter time supplied by Merlin Communications or one of its partners, Sentech in South Africa.

G-One, a production arm of Ginger Media Group, operators of the UK's Virgin Radio, Ginger TV and Ginger Online, was to purchase more SW transmitter time. Virgin already produces the low-key "Global Sound Kitchen" alternative dance music show.

Another UK-based SW project, Earth One, is a multicultural global radio service due to launch in September 2000. Part of Global Vision Network Ltd., it intends to broadcast 24 hours a day on SW, Internet and satellite. Programs will comprise news, current affairs, world music and culture with material drawn from the UN, NGOs and agencies involved in aid and education. Several luminaries including Archbishop Desmond Tutu and Trevor Baylis (inventor of Freeplay wind-up radios) are backing the project.

"African Beacon" is to broadcast its Christian radio service carrying American black ministries, in English, into Africa eight hours a day. The station is backed by Affiliated Media Group (AMG) of Jacksonville, Florida.

Aviation Antiques

It is gratifying to see radio so prominent in the national maritime museum, which is featured in this month's *MT*. But what about aviation and radio? Reader Doug Robertson wrote about a small aviation museum that also highlights radio, although the radios don't necessarily pertain to aviation.

Upstairs at the Aviation Museum of Santa Paula, California, antique radios of every description are tucked into every nook and cranny – even in the restroom. The museum is open 10 a.m. to 2 p.m. the first Sunday of each month or by appointment for groups. Fly-ins by old-time aircraft are frequently on the schedule. Call 525-1109 or 933-1961 or the airport office at 5 933-1155 for more information.

Amateur Radio Spectrum Bill Introduced in Senate

Idaho Sen. Michael Crapo has introduced a Senate bill that mirrors the house Amateur Radio Spectrum Protection Act bill, HR 783. The Senate measure has been designated S 2183.

"In introducing this bill, we want to do something for Amateur Radio in return for all the good

it has done the people of Idaho and elsewhere in the US by providing a reliable means of backup communication in times of emergency," Crapo said.

Like the House version, the Senate bill, if enacted, would require the FCC to provide equivalent replacement spectrum should it ever be necessary to reallocate Amateur Radio frequencies for some other purpose.



May 7: Hagerstown, MD

Antietam Radio Assoc. is holding the 8th Annual Great Hagerstown Hamfest at Hagerstown Community College Recreation Center; gates open 6a.m., bldg 8a.m., adm. \$5. Talk-in 146.94 & 147.09. VEC exams, walk-ins OK at 8:30; contact kuan@visuallink.com. Contact Tina Jones KB8ZQM 304-728-7769 or kb8zqm@intrepid.net, www.qsl.net/w3wewc

Club News:

The Hard-Core-DX list (an email DX club) is joining forces with the Nordic Short-wave Center to create a website which will provide continuity, in-depth analysis and constant availability – something a mailing list fails to provide. The material on both the Hard-Core-DX mailing list and the Hard-Core-DX.com web site is offered free to everybody, without any other obligation than proper credit. www.hard-core-dx.com/

The Association of North American Radio Clubs (ANARC) awarded the 2000 Don Jensen Award for Distinguished Service to Sheldon Harvey. This award is presented annually to the hobbyist that has exhibited the characteristics of leadership, dedication and all around outstanding contributions to the listening hobby. The award was presented at the Winter SWL Festival.

As the President and Publisher of the Canadian International DX Club (CIDX) Sheldon's promotes the listening hobby at every chance. In 1990 Sheldon stepped in as Interim Executive Secretary of ANARC and helped stabilize it during a difficult transition. Sheldon worked diligently with the Coalition to Restore Full RCI Funding in the mid 90s. In the past year Sheldon has embraced the Internet and now produces a free monthly internet newsletter, called Radio H.F. Internet Newsletter, a wonderful resource to finding hobby information on the world wide web.

So far, the House version of the spectrum bill has drawn bipartisan support, with 140 cosponsors to date, and has met with no opposition. However, the Amateur Spectrum Protection Act has not yet moved out of committee. The new Senate bill provides additional motivation for the Congress to consider the legislation.

Iridium Rains

The world's first global satellite telephone system has made history, but not as a communications pioneer. Washington, D.C.-based Iridium shut off service and began winding down operations for their \$5 billion low earth orbit system on March 17, making it one of the top twenty most expensive bankruptcies in history. An estimated 55,000 customers were left without service. Iridium had been operating under bankruptcy protection since last August and had debts of \$4.4 billion.

The plan for Iridium was hatched more than ten years ago, when cellular telephone service was still in its infancy. At the time there were only a million or so cellular subscribers, service areas were small, phones were selling for \$1000 and the average monthly bill was almost \$100. By the time Iridium began offering service in November of 1998, there were more than 60 million cellular subscribers, phones were cheap or free, airtime was inexpensive and coverage was extensive. Few people were ready to spend \$3000 for a bulky phone and \$7 a minute for mediocre service that only worked outdoors. An exception was the United States Government, who purchased several thousand phones and an entire Iridium earth station, all at taxpayer expense.

Astronomers may be the winners, at least temporarily. Radio astronomers will once again have relative quiet in the Iridium frequencies between 1610 MHz and 1626.6 MHz, where they do a great deal of deep space listening. Visual astronomers, along with plenty of amateur observers, will be watching as the 66 operational satellites, along with a dozen or so spares, plunge into the atmosphere one by one and burn up. The de-orbit plan may take up to two years as prime contractor Motorola coordinates with government agencies to clear the skies of their historic system. - Dan Veeneman

New Solar Predictor

The orbiting Solar and Heliospheric Observatory (SOHO) has provided an enormous increase in data regarding the sun. Two scientists, Douglas Braun and Charles Lindsey, have found a new way to interpret and use some of that data. One phenomenon detected by the SOHO satellite are waves caused by acoustic pulses racing through the superheated plasma of the sun. The two scientists discovered a particular pattern to

waves which were affected by solar activity on the opposite side of the sun.

Since the sun rotates every 27 days, correctly interpreting such waves could provide weeks of advance notice of a solar disturbance. "Such a prediction could be important because it would give time to warn the crew of a manned mission to Mars, or astronauts working outside the International Space Station," said Braun.

Other Space News

Space shuttle *Endeavor's* successful mission to map 70 percent of the Earth's terrain using radar has provided enough data to keep scientists busy for a couple of years. The project involved deploying a 26-ft radar antenna at the end of a 197-foot long antenna mast -- the longest rigid structure ever flown in space. Concern about erecting and collapsing the 87 cubes that form the mast into a 9-foot can caused NASA to shorten the mapping mission by one day in case a spacewalk would be required.

Meanwhile on the ground, a 3-foot dish antenna antenna being folded into its launch position in preparation for an April mission on board space shuttle *Atlantis* was damaged when it collided with the basket on a work bridge.

One gyroscope has failed on 9-year-old Compton Gamma Ray Observatory and NASA engineers are considering what to do should one of its two remaining gyroscopes fail. Unlike the Hubble, the Compton observatory was not designed to accommodate repair in space. Wishing to avoid a freefall situation like *Skylab's* re-entry, if engineers determined that the satellite could not be safely controlled with one gyroscope, NASA was to guide the satellite into the Pacific Ocean in mid-March. The Compton was originally designed for a two-year mission.

FCC Announces Filing Window for LPFM

The Mass Media Bureau announces the establishment of a five-stage national filing window for 100 watt low power FM (LPFM) applications. The five-stage filing window approach is designed to ensure the expeditious implementa-

tion of the LPFM service and to promote the efficient use of Commission resources.

The FCC has divided the fifty states, the District of Columbia, Puerto Rico and the remaining jurisdictions into five groups, each comprised of ten states and at least one other jurisdiction. All LPFM applications proposing to locate transmitters in a particular state or jurisdiction must file in the designated five-day filing window for that state or jurisdiction.

The five groups are as follows:

I: Connecticut, Illinois, Kansas, Michigan, Minnesota, Mississippi, Nevada, New Hampshire, Puerto Rico, Virginia, Wyoming

II: American Samoa, Colorado, Delaware, Hawaii, Idaho, Missouri, New York, Ohio, South Carolina, South Dakota, Wisconsin

III: Alabama, Arkansas, Guam, Kentucky, Massachusetts, Montana, Nebraska, New Mexico, North Carolina, Pennsylvania, Washington

IV: Arizona, Florida, Iowa, New Jersey, North Dakota, Oregon, Tennessee, Texas, U.S. Virgin Islands, Vermont, West Virginia

V: Alaska, California, District of Columbia, Georgia, Indiana, Louisiana, Maine, Mariana Islands, Maryland, Oklahoma, Rhode Island, Utah

On March 27, 2000, the FCC will announce the order in which the groups will file. Tentatively, filing windows will follow each other at three-month intervals. However, the Bureau may reduce or increase the amount of time as it gains experience. The dates of each filing window will be announced by Public Notice at least 30 days in advance of the first day of filing.

"Communications" is compiled by editor Rachel Baughn, from news submitted by our readers. Thanks to this month's contributors: Anonymous, NC, NY; Charles Ebert III, Miami, FL; Kevin Klein, Neenah, WI; Doug Robertson, Oxnard, CA; Brian Rogers, Melvindale, MI; Richard Sklar, Seattle, WA; William White, New Bern, NC. Via e-mail: John Figliozi, Robert Heiss, Larry Magne, Mark Meece, Larry Van Horn, Dan Veeneman, and to the ARRL.

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April '96

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Scanning Salt Lake City

By Jon Van Allen KF7YN

Jon Van Allen

Nestled between the Great Salt Lake and an impressive range of snow-capped mountains, the metro area around Salt Lake City, Utah, is home to nearly one million people and attracts an enormous numbers of tourists. Visitors flock to the Mormon Tabernacle church – headquarters of the Church of Jesus Christ of the Latter Day Saints – to hear the famous Tabernacle choir and do genealogical research using the voluminous records maintained by the Mormons. After the novelty of the Great Salt Lake has worn off, the surrounding Wasatch mountains contain some of the most popular ski slopes in North America. There's plenty of activity to provide scanning excitement!

With the world coming to Salt Lake for the Winter 2002 Olympic Games, many public safety agencies in the area are undergoing changes in their communications systems to keep pace with technology and their individual needs.

Seattle, Washington, has successfully combined many individual trunked systems into one big system, linked together by a sophisticated system of networked and multiple trunked sites. The State of Utah and Salt Lake County want to establish a similar system with all police, fire and rescue agencies in the county on a system of networked trunked systems.

This ambitious goal is expected to be complete in time for the 2002 Winter Olympics. It

will be a formidable task to say the least: there are many obstacles to overcome including funding, job issues, politics, etc.

The latest word is that many individual Police, Fire and Rescue agencies will be on 800 MHz trunked systems as part of a greater Utah Communications Agency Network (UCAN) covering the entire Wasatch Front.

UCAN - communications in evolution

After lengthy negotiations, Salt Lake County and the State of Utah are reportedly nearing agreement to merge their emergency communications systems. UCAN has sent the county two merger proposals. County officials have not accepted either, but are confident they form the basis for an agreement. The County would like a compromise between the two proposals.

The merger proposal is part of an effort to convert all Salt Lake Valley emergency response communications to an 800 MHz trunked radio system. The Salt Lake County and Salt Lake City already operate there, but all other valley cities are on 150 and 460 MHz.

The consequences of incompatible communications systems became painfully evident after the August tornado that ripped through downtown Salt Lake City. Emergency response from many valley agencies was rapid, but often confused as incompatible frequencies hampered

coordination. According to assistant Valley Emergency Comm Center (VECC) director Gary Lancaster, "We had units down there that couldn't talk to each other."

The tornado was a wake-up call. Further motivation to integrate Comm systems is the 2002 Winter Olympics, which will involve virtually all the valley's police and fire agencies. Still, the county and UCAN have had their differences.

The county declined to join UCAN's multi-county network when it was established by the Legislature in 1997, mainly because it had purchased its own 800 MHz communications system four years earlier. That \$5 million system, which had to be revamped because of problems, is finally on line.

County Commissioner Mark Shurtleff has been able to bring the two sides together and believes the groundwork has been laid for a deal, but a few differences remain.

Salt Lake County not only wants UCAN to provide airtime and maintenance service, but for the state to kick in \$600,000 to cover what the county has spent on 911 upgrades and Y2k compliance. Shurtleff said "We're going to give up our autonomy in dispatch, and that's a huge step. So we're going to want some things in return."

The county's fire and rescue crews currently are dispatched through VECC. If a deal is made

with UCAN, the County Sheriff also will be dispatched through VECC, which is building a new operations center in West Valley City. If that becomes reality, only Salt Lake City will continue to dispatch its own personnel.

The county passed on an earlier offer to join the valley's other cities and municipalities in a common record-keeping system. The county and Salt Lake City wound up buying one system, the other cities another.

Valley Emergency Communications Center

VECC is a privately owned dispatch center. VECC was created in 1988 to consolidate most of the individual municipality's dispatch and the new 911 center into one efficient, state-of-the-art facility. VECC is located in the Murray City Police and Court Building.

VECC was the first dispatch center in the nation to utilize information received from Caller ID into the 911 system. This integration allows VECC to receive ANI and ALI on police and fire business lines, provided the caller did not block that information.



Jon Van Allen

Sheriff's trunked repeater site

VECC pooled and reassigned each agency's former individual frequencies to provide enough dispatch and working frequencies. New repeater pairs were allocated and agencies formerly on simplex are now on repeaters. Individual Fire Departments who were strapped for enough fireground and working frequencies can now choose from a pool of a dozen frequencies.

This was the easiest way to accommodate everyone. For most departments, it was simply a matter of reprogramming their existing radios. At the time of VECC's inception, trunking was new and unproven. Not one of the agencies wanted to go trunked, and decided in favor of reassigning the existing pool of frequencies.

Not everyone climbed on the VECC bandwagon. Salt Lake City Police and Fire both chose not to join, nor did the City of South Salt Lake. Salt Lake County Fire joined, but the Sheriff's Office chose to continue doing their own dispatching. This may all seem confusing and complicated, but in reality it's easier now to keep track of everyone, and it will get easier as more networked trunked systems come online.

This will greatly enhance interagency communications. Units will be able to talk directly without going through dispatch or a common aid frequency such as a statewide frequency. It will be a simple matter of going to a common talkgroup or selecting the appropriate zone when the need arises to talk to each other.

VECC handles an average of 4,000 calls per day. Approximately 1,800 of those calls are dispatched as 911, police, fire and EMS responses. This figure will more than double at the new VECC center when Salt Lake County Sheriff joins VECC.

SALT LAKE COUNTY SHERIFF'S OFFICE

The old VHF frequencies of the Sheriff's Office are no longer on the air; the move to 800 MHz is complete. The Sheriff's Office patrols unincorporated Salt Lake County and the newly incorporated cities of Taylorsville and Holladay, who chose to contract with the Sheriff's Office rather than hire their own police (and fire/rescue) personnel.

Motorola Type-II Smartzone Networked SysID 643er0

Cell 0: 4 site simulcast (Carrigan Peak, UTA Peak, South Mtn, Mahogany Ridge)
854.5875 856.2375 856.9875 857.4625 857.9375 859.4625 859.7375 (data)

Cell 1: Little Cottonwood Canyon repeater SysID 643er1

866.3000 867.0625 867.5500 (data)

Cell 2: Mountain Dell — Parleys Canyon repeater SysID 643er2

866.4625 867.3500 867.8625 (data)

Cell 3: Big Cottonwood Canyon repeater SysID 643er3

854.4375 857.9875 860.4625 (data)

Cell 4: Adult Detention Complex (ADC) repeater SysID 643er4

866.6750 867.7750 868.0375 868.4275 868.9375 (data)



Alan Muenzel N7GAD

The consequences of incompatible communications systems became painfully evident after the August tornado that ripped through downtown Salt Lake City

Callsign Prefixes:

Alpha	East Patrol
Bravo	East Patrol
Charlie	West Patrol
Charlie 40 and above	COP units
Delta	West Patrol
Echo	South Patrol
Fox	South Patrol
Golf	Gang squad
Holladay	East Patrol units, City of Holladay
Lima	Crime scene units
Sierra	Security Officers
Victor	Public relations/COP (Community Oriented Police)

Unit #	ID
Car-1	Sheriff
1-100	Administrative
20s	Field Lieutenants
100-200	Detectives
200-250	Homicide squad
250-300	Juvenile
300s	Court services
400s	Jail/corrections
500s	County Attorneys (on Govt. system)
600-616	Canyon Patrol
630-650	Motorcycle squad
650-700	SWAT
700s	Level 1 reserve
800s	Level 2 reserve
900s	Search & rescue
Air-1	Helicopter #1
Air-2	Helicopter #2

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Shift Sergeants (number/letter designation)

1-Alpha, 2-Alpha, 1-Bravo, 2-Bravo, 1-Charlie, 2-Charlie, etc.

Patrol Cars (opposite of above, with letter/number designation)

Alpha-3, Bravo-3, Charlie-3, etc. A West Patrol car would be Delta-3 for instance, and his or her Shift Sgt. would be 1-Delta.

Known talkgroup Ids:

Sheriff Code 1	224	
Sheriff West Patrol	256	
Sheriff South Patrol	288	
Sheriff East Patrol	320	
Sheriff Request 1	352	
Sheriff Request 2	384	
Sheriff Car to Car	416	
State Wide	448	
Sheriff Detectives	480	
Court Services	512	
Juvenile Div	544	
Comm Division	576	
Special Ops	608	
SWAT	640	
SLC PD	672	
SLC PD-4	704	East Dispatch
SLC PD-1	720	Dispatch
SLC PD-5	736	West Dispatch
SLC PD-6	768	Car to car
SLC PD-7	800	
SLC PD-2	832	Service
SLC PD-3	864	
SLC PD	896	
Mutual Aid	992	
Metro Drug Unit	1056	Metro Task Force
Metro Drug Unit	1120	Metro Task Force
SLC Fire/Rescue 1	1184	
SLC Fire/Rescue 2	1216	
SLC Fire/Rescue 3	1248	
SL Co Fire/Rescue 1	1408	
SL Co Fire/Rescue 2	1440	
SL Co Fire/Rescue 3	1472	
ADC Const/ Maint	1536	ADC = Adult Detention Complex (New jail)
ADC	1568	
Radio Comm	1600	
ADC	1632	
ADC	1664	
ADC	1696	
ADC	1728	
ADC	1760	
Animal Control-1	1792	
Matheson Court 1	1824	
Matheson Court 2	1856	
State of Utah EOC	1888	EOC = Emergency Operations Center
W. Valley PD Disp	2016	Link from 460.350 (not always active)
Jordan School Dist	2400	Security
Sheriff Admin	2912	Administration & Investigations
Animal Control-2	2944	
Metro CID	3200	Criminal Investigations
City Drug Unit	3296	SLC PD Drug Task Force
ADC Const/Maint	4064	
Radio Motorola Ch 2	4096	Radio Techs
Unknown Metro Agency	5216	Surveillance/Stakeout heard

Unknown Metro Agency 5408 Surveillance/Stakeout heard

Salt Lake County Sheriff's Office 10 Codes

10-0 Caution	10-51 Request Tow Truck
10-1 Weak Signal	10-52 Request Ambulance
10-2 Good Signal	10-53 DOA
10-3 Stop Transmitting	10-54 Traffic Control
10-4 Acknowledged	10-55 Intoxicated/D.U.I.
10-5 Relay	10-56 Traffic Problem
10-6 Busy	10-57 Hit and Run
10-7 Out of Service	10-58 Follow-Up
10-8 In Service	10-59 Reckless Driver
10-9 Repeat	10-60 Out with violator
10-10 Negative	10-61 Motor Inspection
10-11 On duty	10-62 Stolen Vehicle
10-12 Stand By	10-63 Vehicle Burglary
10-13 Existing Condition	10-64 Vandalism
10-14 Message/Info	10-65 Juvenile Problem
10-15 Message delivered	10-66 Prepare to Copy
10-16 Reply to message	10-67 Make call yourself
10-17 Enroute	10-68 Runaway Juvenile
10-18 Urgent	10-69 Missing Person
10-19 Contact	10-70 Unnecessary use of Radio
10-20 Location	10-71 Fight in progress
10-21 Call by Phone	10-72 Indecent Exposure
10-22 Disregard	10-73 Rape
10-23 On Scene	10-74 Civil Disturbance
10-24 Assignment Complete	10-75 Domestic Problem
10-25 Meet at	10-76 Meet Complainant
10-26 ETA	10-77 Return to:
10-27 License Check	10-78 Back-Up Units
10-28 Registration Check	10-79 Stolen Bicycle
10-29 Warrant Check	10-80 Vehicle Pursuit/Chase
10-30 Danger/Caution	10-81 Shoplifting
10-31 Pick-Up	10-82 Prisoner in Custody
10-32 Units needed	10-83 Confidential Info
10-33 Help Quick!	10-84 Visitors Present
10-34 Time check	10-85 Victims Condition:
10-41 Beginning Shift	A: Fair, B: Critical, C: Poor
10-42 Ending Shift	D: Possible Fatal, E: Obvious Fatal
10-43 Shuttle	10-86 In Progress
10-44 Permission	10-87 Abandoned Car
10-45 Animal Problem	10-88 Man with a gun
10-46 Motorist Assist	10-89 Bomb Threat
10-47 Suspicious Vehicle	10-90 Alarm
10-48 Disturbing the Peace	10-91 Burglary
10-49 Assault	10-92 Theft
10-50 Traffic Accident	10-93 Armed Robbery
-PI Injury	10-94 Switch to:
-PD Property damage	10-95 Out at Home
-F Fatal	10-96 Mental Subject
10-51 Request Tow Truck	10-97 Shooting
10-52 Request Ambulance	10-98 SL Co Sheriff's Office Check
10-99 Wanted/Stolen	

SALT LAKE COUNTY GOVERNMENT**Motorola Type II**

854.7125 856.7125 857.7125 858.7125 859.7125 858.4625 860.7375

IDs

240 Roads & Bridges

816 Roads & Bridges construction crews
848 Granite School District Security
1008 Garbage collection
1040 ?
1200 Roads & Bridges
1584 Garage, County Shops
1776 ?
1968 Sheriff Emergency-1
2000 Parks & Recreation
2160 Ch 2A (unknown agency)
2192 Ch 2B "
2352 Sheriff Admin Backup
2384 Sheriff West Patrol Backup
2416 Sheriff South Patrol Backup
2448 Sheriff East Patrol Backup
2576 Delta Center Security
2608 "
2640 "
2960 Animal Control Dispatch
3248 Division of Aging Services
3472 ?
3536 ?
3504 ?

Statewide County Designators for SL Co:

(I as in India)

11 Salt Lake County	101 West Jordan
21 Salt Lake City	131 Draper
31 Murray	141 South Jordan
41 Kearns	151 Riverton
51 West Valley City	161 Copperton
61 Magna	171 Lark
71 Midvale	181 Bluffdale
81 South Salt Lake	191 Herriman
91 Sandy	201 Alta

VALLEY EMERGENCY COMMUNICATIONS CENTER**(VECC)**

Consolidated dispatch center for the following:

Midvale Police / Fire / Rescue

Murray Police / Fire / Rescue

Salt Lake Community College, Taylorsville (West Jordan PD dispatch)

Sandy City Police / Fire / Rescue

South Jordan Police / Fire / Rescue

West Jordan Police / Fire / Rescue

West Valley City Police / Fire / Rescue

*Bluffdale, Draper and Riverton Fire / Rescue

*Contract agencies

VECC Police and Fire Mobile Data Terminals (MDTs) are on 855.8375 MHz using CDPD (Cellular Digital Packet Data) encrypted protocol.

Dispatch of Fire and rescue units is all done on Ch-1 to all areas covered by VECC. One only needs to monitor Ch-1 for all Fire & rescue calls. Units are directed to respond on Ch-2 or 3. On scene comms are on Tac Channels 4 through 10. Individual agency channels are for paging or fireground ops, otherwise all units monitor dispatch. Police freqs are listed separately as they are dispatched separately.



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Responding to a serious accident in Taylorsville - Photo by Marc Peterson KA7SLC sheriff's office

VECC Fire & Rescue

Ch-1	153.890	Dispatch
Ch-2	154.175	Response Channel 2
Ch-3	153.770	Response Channel 3
Ch-4	154.130	TAC 4
Ch-5	154.220	TAC 5
Ch-6	154.250	TAC 6
Ch-7	154.265	TAC 7
Ch-8	154.295	TAC 8
Ch-9	154.355	TAC 9
Ch-10	154.415	TAC 10
Ch-11	155.955	Police TAC
Ch-12	151.115	Service VECC Dispatch
Ch-13	154.280	Mutual Aid Statewide
Ch-14	154.340	SL Co Fire, Fireground (SLC Fire F-3)
Ch-15	155.505	Statewide Police Mutual Aid
Ch-16	155.340	"HEAR" Chnl, Ambulance/Rescue to Hospital
Ch-17	153.845	Sandy City Fire
Ch-18	154.965	Sandy City Fire
Ch-19	154.830	Sandy City Police
Ch-20	162.550	NOAA Weather Radio

West Jordan Police

Ch-1	155.130	Dispatch
Ch-2	156.210	Service (simulcast on 460.025)
Ch-3	155.505	Statewide
Ch-8	154.130	Tac / Car to Car

7-Papa = West Jordan Patrol
College = Salt Lake Community College Police (Taylorsville)

Midvale & South Jordan Police

Ch-1	151.115	Dispatch
Ch-2	156.210	Service / Alt Dispatch (formerly Tac)
TAC	155.955	Shared with Sandy

Murray Police

Ch-1	460.425	Dispatch
Ch-2	460.450	Car to car
Ch-3	460.025	Service

Sandy City Police

Ch-1	154.830	Dispatch
Ch-2	155.955	Tac / Car to Car
Ch-3	156.210	Service

South Salt Lake Police/Fire

Ch-1	460.075	Police Dispatch
Ch-1	453.800	Fire Dispatch

West Valley Police VECC Dispatch

Ch-1	460.350	Dispatch
Ch-2	460.025	Service
Ch-3	460.400	Car to car
Ch-4	460.525	Tac
Ch-5	453.275	Common with Animal Control & local Govt.
Ch-6	458.900	Tac simplex
Ch-7	458.400	Tac simplex
Ch-8	460.125	Statewide

West Valley Fire

Ch-1	460.575	West Valley Fire
Ch-2	460.600	West Valley Fire
Ch-3	460.625	West Valley Fire

Alta, town of (Little Cottonwood Canyon)

???	Alta town Marshall
154.370	Alta Fire Dep't

SALT LAKE CITY POLICE & FIRE TRUNKED

Motorola Type-II Smartzone Networked SysID 643er5 linked with SL Co. Sheriff's Office and SL Int'l Airport systems.

Cell 5:

855.2375 857.2375 858.2375 859.2625 860.2625
866.0750 866.3500 866.6000 866.8500 867.2500

Talkgroup IDs: Same as SL Co Sheriff

As of this writing, Salt Lake City Police and Fire are still on UHF as the move to 800 MHz continues.

Salt Lake City Police: KX1985

Ch-1	460.100	West Patrol
Ch-2	460.150	East Patrol simulcast with Ch-1 off peak hours
Ch-3	460.200	Car to car
Ch-4	460.300	Service
Ch-5	460.375	Tac
Ch-6	460.050	Admin/ Narc/ Vice

Salt Lake City Fire & Rescue

Ch-1	154.430	Fire Dispatch
Ch-2	154.310	Rescue/Med
Ch-3	154.340	Alternate
Ch-4	154.280	Common with VECC, Statewide Fire

University of Utah (U of U)

Ch-1	154.725	U of U Police
Ch-2	154.815	U of U Police

SALT LAKE AIRPORT AUTHORITY

The Salt Lake Airport Authority operates an 800 MHz type-II trunked system. This is an important system to monitor. Aircraft emergencies, Airport Police and Fire units all contribute to very interesting scanning. There have been several aircraft emergencies declared in the last few months, when all the emergency talkgroups lit up with activity. Don't overlook this system as an important source of information.

Salt Lake Airport Authority

Motorola Type-II system
856.4875 857.4875 858.4875 859.2375 859.4875 860.4875

IDs

208	Engineering Ch 2
256	SL Co Sheriff West Patrol (patch)
368	Building maint. (Environmental)
400	Maint, parking lots, roads, runways, sdwlks, snowplows, etc.
432	Electrical maint Ch 1, lighting, security cams & devices, etc.
496	Electrical maint Ch 2
528	Rescue/Med
560	Rescue/Med Ch 3 Bravo
592	Airport Security
624	Airport Security Ch 6 Alpha
656	Vehicle maint
688	Engineering Ch 1

736 Shuttle vans Ch B
 848 Airport Ops Ch 1
 880 Airport Ops Ch 2
 976 Shuttle vans Ch A
 1136 Rescue/Med (alt?)
 1200 SLC Fire (Airport fire stations)
 1232 Airport Police Dispatch Ch A
 1296 Airport Police Ch C (usually called "Charlie")
 1360 SLC Fire, Airport Fireground (Tac)
 56464 Avis

VECC & Salt Lake Police - Fire & Rescue Dispatch Codes

Alpha Fair Condition	16 Eye Problem
Bravo Poor Condition	17 Fall
Charlie Critical	18 Headache
Delta Possible Fatal	19 Heart Problems
Echo Obvious Fatal	20 Head/Cold Exposure
	21 Hemorrhage
1 Abdominal Pain	22 Industrial Accident
2 Allergies	23 Overdose
3 Animal Bite	24 Pregnancy/Birth/Miscarriage
4 Assault/Rape	25 Psychiatric/Behavioral
5 Back Pain	26 Sick Person
6 Breathing Problems	27 Stabbing/Shooting
7 Burn	28 Stroke
8 Carbon Monoxide Poisoning	29 Traffic Accident - Injury
9 Cardiac Arrest	30 Traumatic Injury
10 Chest Pains	31 Unconscious Person
11 Choking	32 Unknown / Man Down
12 Convulsions/Seizures	
13 Diabetic Problem	'29C' = traffic accident with victim
14 Drowning/Diving Accident	in critical condition.
15 Electrocutation	

VECC/SLC PD 9 & 10 Codes

9-1 Officer Needs Help!	10-33 Help Quick!
9-2 Send Back-Up	10-33A Psychiatric Problem
9-7 Armed with a gun	10-33B Violent Person
9-8 Mental Subject	10-33C Armed & Threatening
9-11 Death	10-33D Firefighter Injured
9-17 Robbery	10-34 Time Check
9-21 Burglary	10-39 Lights & Siren
10-4 Affirmative	10-40 Lights, No Siren
10-6 Busy	10-41 On Duty
10-7 Armed with a gun	10-42 Off Duty
10-9 Repeat	10-45 Request Back-Up
10-10 Home	10-46 Confirm Status
10-12 Stand By	10-50 Traffic Accident
10-13 Shakedown	10-55 D.U.I.
10-14 Stakeout	10-60 Out with violator
10-15 Prisoner in custody	10-80 Chase
10-19 Return to station	10-99F Warrant - Felony
10-20 Location	10-99M Warrant - Misdemeanor
10-21 Telephone	Code-1 Emergencies only
10-22 Disregard	Code-2 No lights, Siren
10-27 Drivers License Chk	Code-3 Lights & Siren
10-28 Registration Check	Code-4 Status: OK
10-29 Warrant Check	

UTAH HIGHWAY PATROL

Section 4 Salt Lake County
 154.905 Ch-1 Dispatch
 155.580 Ch-2 Capitol Police
 155.745 Ch-3 Car to Car

UTAH STATE PRISON

460.0125	State Prison	Outside Security	WNFD738
460.0875	State Prison	Fire	WNFD738
460.1625	State Prison	Security	WNFD738
460.2250	State of Utah	Corrections	WNFD738 Repeater
460.2625	State Prison		WNFD738
460.3375	State Prison	Max Security	WNFD738
460.4125	State Prison	Minimum Security	WNFD738
460.4625	State of Utah		WNFD738
460.5625	State Prison	Medium Security	WNFD738

STATE OF UTAH (MAGNA)

Criminal Investigations Division (CID)

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 856.4375 857.4375 858.4375 859.4375 860.4375

State of Utah 10 Codes (UHP, CID)

10-0 Caution	10-51 Request Tow Truck
10-1 Weak Signal	10-52 Request Ambulance
10-2 Good Signal	10-53 DOA
10-3 Stop Transmitting	10-54 Change Channel
10-4 Acknowledged	10-55 DUI
10-5 Relay	10-56 Intoxicated Person
10-6 Busy	10-57 Hit and Run
10-7 Out of Service	10-58 Plane Crash
10-8 In Service	10-59 Reckless Driver
10-9 Repeat	10-60 Out with Violator
10-10 Negative	10-61 Motor Inspection
10-11 On Duty	10-62 Car to Car
10-12 Stand By	10-63 Prepare to Copy
10-13 Existing Condition	10-64 Vandalism
10-14 Message/Info	10-65 Juvenile Problem
10-15 Message Delivered	10-66 Major Crime
10-16 Reply to Message	10-67 Net Message
10-17 Enroute	10-68 Runaway Juvenile
10-18 Urgent	10-69 Missing Person
10-19 Contact	10-70 Fire Alarm
10-20 Location	10-71 Nature of Fire
10-21 Call by Phone	10-72 Progress of Fire
10-22 Disregard	10-73 Rape
10-23 On Scene	10-74 Civil Disturbance
10-24 Assignment Complete	10-75 Domestic Problem
10-25 Meet at:	10-76 Meet Complainant
10-26 ETA	10-77 Return to:
10-27 License Check	10-78 Back-Up Units
10-28 Registration Check	10-79 Notify Coroner
10-29 Warrant Check	10-80 Vehicle Pursuit/Chase
10-30 Danger/Caution	10-81 Breathalyzer
10-31 Pick-Up	10-82 Prisoner in Custody
10-32 Units Needed	10-83 Confidential Info
10-33 Help Quick!	10-84 Visitors Present
10-34 Time Check	10-85 Victims Condition:
10-35 thru	A: Fair B: Poor C: Critical
10-40 Reserved	D: Possible Fatal E: Obvious Fatal
10-41 Beginning Shift	10-86 In Progress
10-42 Ending Shift	10-87 Abandoned Car
10-43 Shuttle	10-88 Man with a gun
10-44 Permission to:	10-89 Bomb Threat
10-45 Animal Problem	10-90 Bank Alarm
10-46 Motorist Assist	10-91 Burglary
10-47 Suspicious Vehicle	10-92 Theft
10-48 Disturbing the Peace	10-93 Unnecessary Use of Radio

10-49 Traffic light Out	10-94 Call Home
10-50 Traffic Accident	10-95 Out at Home
PI Injury	10-96 Mental Subject
PD Property Damage	10-97 Test Signal
F Fatal	10-98 Prison Break
10-99 Wanted/Stolen	

Epilogue

On August 11, 1999, Salt Lake City experienced an extremely rare tornado which tore through the downtown and historic Avenues area. The State Emergency Operations Center (EOC) frequency 155.025 immediately lit up with traffic between various agencies in Salt Lake County. Other emergency nets also became active during the assessment, operations and cleanup phase of the damage caused by the tornado.



Alan Muenzel N7GAD

Electricity and phone service was interrupted and it was difficult to get a phone line in or out of the area as word of the tornado spread. Several ham radio nets were activated with health and welfare traffic until phone service was restored.

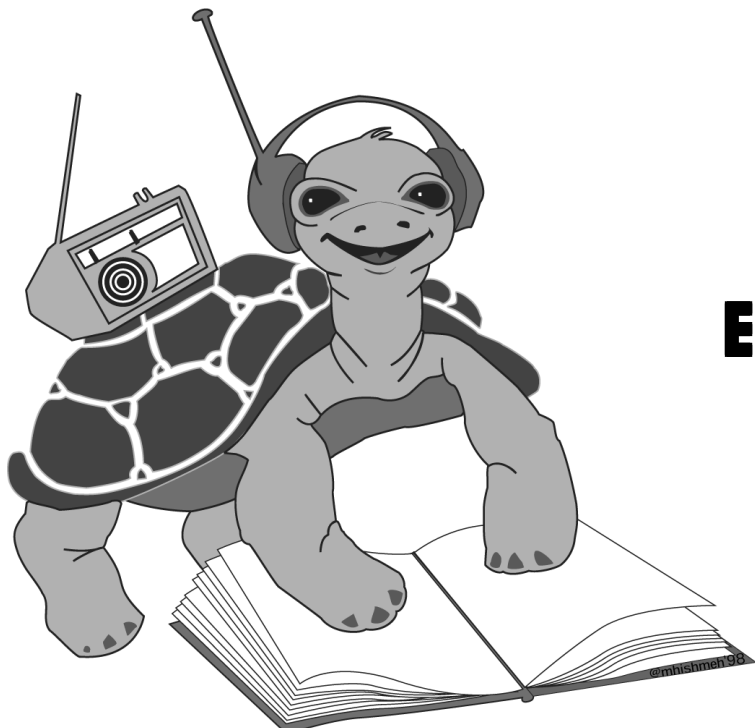
Don't forget to program that state EOC frequency in your scanner; you never know when you will need it! It's also a good idea to have frequencies for power, water, gas and telephone programmed in one of your lesser used banks for emergencies.

Anyone needing specific frequencies not covered here may contact me at kj7yn@att.net. I can provide federal, military, air and certain business frequencies from HF through UHF. You can also visit the new Rocky Mountain Radio Association scanner club website at www.real-utah.com/rmra for the latest information on scanning in the Salt Lake City area.

Military monitoring enthusiasts will also find an in-depth profile of nearby Hill AFB, Utah, in this month's Milcom column.

About the Author:

Jon Van Allen was born in Salt Lake City and has lived in the area most of his life. He works as a Radio Electronics Officer aboard a container ship and enjoys scanning, swl, ham radio and camping. He is the Editor for the RMRA Ham Radio and Scanner Group.
<http://www.real-utah.com/rmra>



VOA's Special English: A 40-Year Success Story

By Mark B. Lewis

It can't be done, don't try it, experts in American universities warned. Take that radio program off the air, American embassies overseas urged Washington – "it's insulting and demeaning."

Foreign listeners disagreed.

Today, it is arguably the most unique and successful program in the history of international broadcasting by the United States and yet hardly anyone in this country has ever heard of it.

Forty years ago this past October, a veteran radio announcer named Paul Parks walked into a broadcast studio of the Voice of America, sat down in front of a microphone and told the world for the first time: "This is the Voice of America broadcasting in Special English."

The Voice of America, principal international radio system of the United States, has been

broadcasting since February 24, 1942 – 79 days after the U.S. entered World War II. VOA broadcasts news and features today in 52 languages, including English. And, according to VOA, each week 91 million listeners tune to its programs.

When the first Special English broadcast went on the air, Paul Parks began reading a 10-minute news program slowly and carefully. He read at nine lines a minute, as opposed to the usual 12-14 lines a minute in VOA broadcasts and the more conventional 15 or even higher in commercial broadcasting in the United States. Parks' rate of delivery had to be slow enough so that each word would be clearly understood by shortwave listeners. And the words were in simplified English, designed for people for whom English is a second language.

There was no model and no precedent for such a broadcast in slow-speed English using simple words. It was an experiment and a gamble. Would anyone listen to such a program? And if they listened, would they respond?

First reaction came swiftly from American officials in embassies abroad. They groaned. They criticized the broadcast as "Baby English." That's exactly what language professors had warned about after VOA had commissioned several American universities to conduct feasibility studies on whether it was possible to broadcast news and information in a simplified form of the English language.

There are more than a half-million words in the English language. VOA wanted to know if only 1,000-1,500 words could be used to bring news and information to people around the world. The universities advised that it was impossible.

VOA officials decided to go ahead with the experiment anyway. All they could say to the professors and embassies was that the program was not designed for the ears of Americans, was not meant for Americans. Two weeks after the first broadcast, mass reaction from foreign lis-

teners began to arrive at VOA and it was surprisingly favorable. There was a much larger audience than anticipated.

"The program is excellent. Local people can follow every word," said a letter from Baghdad. "The program is especially valuable to young people," said a letter from Cairo. "The simpler yet complete reporting of the news is wonderful," a letter from Senegal declared.

The longer Special English stayed on the air, the more listeners it gained. Americans living abroad still didn't like it. They said it was "too slow and too simple." But non-Americans who spoke some English as a second language sent hundreds of letters in the first month praising the broadcasts, and foreign teachers began using tape recordings of the programs to teach their students. American Peace Corps teachers abroad did the same and are doing so today.

Three hundred to five hundred letters of praise and thanks for Special English arrive at VOA every month today from foreign countries, as well as 300 e-mails a month, the majority from China.

What began as an experiment 40 years ago emerged as a new craft. Writers learned how to use short sentences and no idioms in the news. Announcers learned to speak slowly. Something new was developed in shortwave broadcasting that was uniquely the product of the Voice of America.

So now, an American radio program that started as a gamble has been on the air every day for 40 years; a program that speaks to the world in a simplified vocabulary of only 1,500 words, in slow-speed English. A smiling turtle, appropriately, is the program's logo on its literature.

Back to the Beginning

Why was such a program initiated? Who were the initiators? What was their purpose?



Special English was the brainchild of then-VOA-Director Henry Loomis.

Why was the program given the name "Special English"? Has such a program tangibly improved the ability of millions of non-Americans to understand spoken English and to understand more about America – its people, history and culture?

Back in 1959, the Director of the Voice of America was Henry Loomis, a 41-year-old energetic Harvard graduate who had served on government committees dealing with international communications. As head of VOA he traveled abroad extensively, meeting with foreign officials and non-officials. And he always returned to Washington with the same frustration: his language skills and their English were limited, making for difficult communication.

His travels also confirmed a trend that VOA had been watching and sensing: the English language was emerging as a common denominator of the post-war era, a truly international language, a great force of attraction. People of all ages revealed a hunger to master it as a window on the world, as their personal stake in the future. Can't VOA lend them a hand? Loomis asked.

He turned to his Program Manager, Barry Zorthian, and asked him to fashion a broadcast tool which would enable anyone with a minimal knowledge of English to acquire information and knowledge.

"Our purpose was not teaching English," Zorthian says today. "What we wanted was to convey information to listeners who had a limited knowledge of English."

Zorthian, as a veteran VOA News chief, had also recognized that people throughout the world for whom English was a second language had reported some difficulties understanding the more complex structure and phraseology that VOA news tended to use, and they were more familiar with a British accent than an American accent. So he wondered whether a somewhat simplified vocabulary and simple phraseology might be more effective. This idea was discussed at length and the concept of a limited-vocabulary broadcast grew.

"The academics really did not do us much good. They helped some, but we had to develop it ourselves," Zorthian said. He put together a small team of young people to develop a limited English vocabulary that would reduce more complex words to their simplest form.

They studied the scripts of VOA news broadcasts and other features and other tapes of broadcasts for months, looking at the frequency with which words are used or were used at the time. Many of these words are current in ordinary, everyday English, but many of them are peculiar to international communication. So the job was to combine the words of ordinary discourse with those that are peculiar to the conveyance of news and information.

The VOA team developed a tentative list of words that might be used. Most of them were common everyday words of the English language, like man, farm, talk, today or yesterday. Other words were necessary for reporting world events, like treaty, aggression, disarmament, agenda, compromise.



The Special English staff at their 40th Anniversary celebration.

Thus the first rule the VOA team established for their new kind of English was to limit the number of words that could be used to write the programs. The second rule was to join everyday words with those needed for reporting world news in short, easy to understand sentences. The third rule was for the announcer to speak slowly and carefully so that each word was clear.

Last May, when Israel elected Ehud Barak as its new Prime Minister, the lead paragraph of VOA's standard English news broadcast was:

"Israeli Labor Party leader Ehud Barak has won a decisive election victory over incumbent Prime Minister Benjamin Netanyahu – who has already conceded defeat."

The lead of the VOA Special English broadcast that day said: "Israeli Labor Party leader Ehud Barak has been elected the next Prime Minister of Israel."

Finding a name for this kind of slow-speed program was a problem that produced hot debate within VOA. There was general agreement that people might not listen if the name seemed to suggest that it was only for students or for people wanting to learn English or who did not understand English well.

Some proposed the names "Short English," "Basic English," "American English," "Simple English." All were rejected. A decision was made to call the program "Special English." No one really liked this name, but no one could think of a better one. So Special English it was. Today, 40 years later, the thousands of testimonials over the years from listeners show that the program has unquestionably assisted in the spread and nurturing of English as an international language.

The enormously favorable worldwide reaction to the program during the first two years inspired the resourceful, hard-driving Zorthian to expand his horizon. News in Special English was not enough. He ordered the addition of short feature programs in slow-speed English right after the news. Features in Special English, he argued, could also help foreign listeners acquire a better understanding of what America is about and what its people represent.

Ever since the early 60s, therefore, the Special English half-hour broadcast has included two, slow-speed features each day after the news. The features are American to the core, such as "This is America" about life in the USA; "The Making of a Nation," an American history series; "American Mosaic" about American music, books, movies; "Words and Their Stories," explanations of American sayings; "20th Century Americans," and "American Stories," adaptations of short stories by famous American writers. Features on science and agriculture are part of the mix.

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"American Stories" by authors such as Jack London, Herman Melville, Mark Twain, Nathaniel Hawthorne, Washington Irving, Edgar Allan Poe became so popular with listeners that VOA put the texts of each broadcast into a booklet that listeners request by the hundreds each month. Similarly, thousands of the "VOA Special English Word Book" and "Words and Their Stories" have been distributed in booklet form in response to listeners' requests.

Forty Years and Going Strong ...

The annual cost of Special English today is \$816,000. "It's one of the best investments VOA has ever made," according to former director Henry Loomis.

The current management is especially gratified by the growth of the listening audience in China. As mentioned, hundreds of e-mails about Special English come from there each month. Two recent examples:

"I have heard that this October will be the 40 years anniversary of VOA Special English program. I would like to convey my congratulations. I am a constant listener. I am a 54-year-old Chinese man, a food processing technologist. I began listening to VOA Special English in 1980."

"I love your Special English. I am a serious listener since the early 1980s. I am now in my late forties. I am using this program to teach my two sons."

But not all the E-mails from China have been positive. There was angry Chinese reaction after NATO mistakenly bombed the Chinese embassy in Belgrade on May 7 last year, and the number of E-mails from China to VOA Special English dropped sharply, but they quickly returned to the usual levels in a few days.

Special English scripts on the history of medicine have been used as teaching materials at Beijing Medical College and Jiangxi Medical College. Special English tapes are used by professors at several Chinese universities. "The materials are more precious than diamonds to me," one professor wrote. Central Peoples' Broadcasting Station in Beijing has rebroadcast VOA Special English tapes on their weekly program "English on Sunday."

A brief sampling of audience mail from other parts of the world illustrates the global reach and influence of Special English. Writing from Ethiopia, high school student Tewodros Solomon said: "Thanks to Special English, I can get up-to-date information on science, agriculture, environment, current news, music, movies, and a chance to know more about the history of the United States."

From Mbala, Zambia: "You would be pleased as punch to see the faces of young Zam-

bians as they listened to Nathaniel Hawthorne's *The Ambitious Guest*."

Special English has a large audience in Africa. Tarzaar Addai, writing from Nigeria, reports listening to the program for 20 years. "I find Special English the ideal language for shortwave reception because its slower speed and clear pronunciation ensure that words are not lost. I want to know about the First Lady in the Lincoln Presidency, Mary Todd, her birthplace and married life, and number of children."

Special English regularly receives queries like that. Jesus Evelio Munez of Bogota, Colombia asked recently: "How is the Educational System in your country? How is its quality? What is the difference between public schools and private schools?"

Listeners in Iran and Cuba tell VOA how Special English affects their lives. An E-mail

Word book and possibly some tapes for phonetic training."

Although the program was not designed as an English-teaching device, when foreign listeners report that it improves their spoken English and their understanding of the language, this is a plus in the eyes of VOA for three reasons. It increases the prospect of positive attitudes toward the United States and greater understanding of America. It stimulates listeners to tune in VOA's broadcasts in standard English, and it improves communication in the field between Americans abroad and local citizens.

Henry Loomis, now 80 and retired in Florida, was in Washington in October as guest of honor at a VOA celebration marking the 40th anniversary of Special English. He headed VOA during both Republican (Eisenhower) and Democratic (Kennedy) administrations. He was never without ideas and encouraged others to suggest constructive innovations. He had an experimental cast of mind, and this hasn't changed. In an interview for this article, he posed two questions:

1. Can Special English be done or adapted for television?

2. Shouldn't there be an amendment to the current law that would allow VOA Special English materials to be used in the United States for immigrants to these shores? The Smith-Mundt Act of 1948 prohibits the dissemination of VOA materials in the U.S. But Congress itself occasionally makes exceptions, and Loomis believes that VOA Special English should be exempted from the rule in order to improve the ability of immigrants to understand spoken English. Approximately 700,000-900,000 immigrants come to America each

year, according to the U.S. Immigration Service.

In its 58 years of broadcasting, VOA has had many success stories, but few of them rival the story of Special English. Dobrin Tzotzkov of Sofia, Bulgaria, recently sent a letter to VOA eloquently explaining why he listens regularly to Special English:

"The sounds of VOA Special English fill my room every morning when I wake up and raise the curtains. Your program has become an inseparable part of our daily life - a unique window into the world, a model of clear, exact and straightforward language, a never failing source of hope, confidence and joy. You enrich the mind with your cultural, historical, social and science programs. People often ask me: How, where and when did you and your family learn so much about mankind, earth, space? How did you manage to collect so much faith and confidence? My answer is VOA Special English - Thank you!"

This article was first published in *ESL Magazine*, Sept/Oct 1999.



Marilyn Christiano (chief of Special English staff) accepts award at 40th anniversary celebration from VOA Director Sandy Unger (center), and Broadcasting Board of Governors Chairman Marc B. Nathanson (right)

from Teheran: "Many times I wanted to write letters to you, but I was afraid, because I was not sure I could write in a way that could reflect what was in my heart.... I THANK YOU BECAUSE YOU DID SOMETHING THAT NO ONE COULD DO. I SUFFER FROM VISUAL PROBLEMS, SO YOUR PROGRAMS HELPED ME A LOT." A letter from Ciudad Habana, Cuba: "I'm sure that you are not able to imagine how many people listen to you every day. You broadcast the most important news and later give us important reports about science, environment, agriculture and then follow with the 15 minute programs about all the things people are interested in."

More students in the newly independent states of the former Soviet Union are listening to Special English. In April this year, four students in Tajikistan signed an E-mail to VOA, saying: "Our English is improving, thanks to your program. But we want to improve our vocabulary. Please send us the Special English

Independence and Innovation at the VOA

by Mark B. Lewis

A great deal has been written and spoken, both pro and con, about the abolition of the formerly independent U.S. Information Agency and its assimilation into the State Department on October 1 last year as a function of Public Diplomacy. But another simultaneous and related important development has been almost completely overlooked: what happened to the Voice of America, this nation's principal international broadcasting system for 58 years, which broadcasts in 53 languages to virtually every country in the world except this one.

Long the biggest part of USIA, the U.S.-funded Voice was not folded into the Department of State along with the information agency. Instead, in the reorganization of the foreign affairs agencies, VOA was given autonomous status as an independent federal entity — outside the State Department.

The handwriting of VOA's new role has been on the wall for many years. For decades, VOA had been opposing "unwarranted interference" in the journalistic integrity and objectivity of its news broadcasts, meaning tinkering with the news by either State Department policy makers or by USIA, the parent organization of VOA. Credibility is everything, VOA argued. Lose credibility and you lose your audience. And VOA's position prevailed, even getting a Charter signed into law by President Gerald Ford in 1976 that underlined the need for credibility to "win the attention and respect of listeners."

As a result, the State Department and USIA have, for many years, adhered to a hands-off practice with regard to VOA news. No longer could a senior USIA official sit in the VOA newsroom and examine news stories before they were broadcast, as happened during the Cuban missile crisis of 1962. And ever since the 1990 Gulf War, the Department of State has had only one role in the daily operations of VOA: to approve

or disapprove editorials concerning U.S. foreign policy planned for VOA broadcast. The editorials are separated from the news and are identified as editorials "expressing the policies of the United States government."

All of this is related here in order to illustrate that VOA really has had de facto independence for many years. It's been a story of gradual accretions to the current status as an indepen-

dent organization, long before Senator Joseph Biden appeared on the international broadcasting scene and long before his indictment of the State Department last October, twelve days after the USIA-State merger.

Commemorating the independence of VOA and the other U.S. international broadcast stations such as Radio Free Europe/Radio Liberty, Radio Free Asia, Senator Biden told VOA employees in the VOA auditorium: "The Voice of America gained added protection against interference by the foreign policy agencies...Many people in the State Department and elsewhere in the government wanted broadcasting to be folded into State along with the rest of USIA. Senator Helms and I convinced our colleagues that placing broadcasting inside the State De-

partment would be the equivalent of a death sentence, threatening both the budget and journalist integrity..." Senator Biden is the ranking Democratic member of the Senate Foreign Relations Committee chaired by Republican Senator Jesse Helms.

As an independent federal entity, VOA today is responsible to a bipartisan, presidentially-appointed Broadcasting Board of Governors, which oversees all U.S. international broadcasting. The Secretary of State is an ex-officio member of the Board to provide broad foreign policy guidance at the Board's monthly meetings. But the Secretary has no supervisory authority and casts only one of nine votes. The Board was established by the U.S. International Broadcasting Act of 1994. Its oversight mission prominently calls for the protection of the professional integrity of VOA and the other broadcasters. Board chairperson Marc Nathanson often refers publicly these days to the need for "a firewall between the international broadcasters and the policy-making institutions in the foreign affairs community."

The "firewall" concept is a persuasive argument, particularly with regard to news broadcasts. It figured in the decision not to move VOA along with USIA into the State Department.

U. S. international broadcasters, so this argument goes, should not be perceived as mere adjuncts of the Department of State or be subject to the daily pressures of diplomacy. This same argument was advanced unsuccessfully by opponents of the USIA-State merger. Senators Helms and Biden disagreed and they led the move to abolish USIA as an independent agency while carrying the day for the independence of VOA. (Go figure.) The principle of credibility in communicating information apparently gets a different interpretation depending upon who is doing the disseminating.



The staff of Talk to America

Talk to America

In the eyes of VOA, one of its most credible programs since 1994 is called *Talk to America*. Simultaneous TV is a recent addition. It's a daily, live, one-hour, call-in program, broadcast worldwide in English. The program is not intended to be just about America but what may be happening anywhere in the world.

A different subject, chosen by VOA, is discussed every day, and a different guest expert every day participates and answers listeners' questions that are phoned in collect. A number of VOA's language services, including Russian, Chinese, Turkish, Farsi, conduct weekly call-in programs with the same name in their languages. VOA leaves the choice of subjects and guest experts up to the judgment of the staff of the language services.

Talk to America unquestionably reflects the nature of a free and open society. The guest specialists offer their own opinions in answering listeners' questions or addressing the program's subject. The VOA host of the program makes no effort to represent official views or positions. In short, there is no spinning. And the weekly agenda of subjects and guests is distributed only within VOA every Monday, though the State Department and the public can read it on VOA's web site. "We have never had a complaint from the State Department," the producer notes.

It is no easy task to select a different subject five days a week. Topics have included "Education in the U.S.," "Teenagers in America," "Freedom of the Press" here, "Hiring People with Disabilities in America," "the Cuban boy Elian Gonzalez," "WACO Revisited" (scene of a violent confrontation about five years ago between the government and the Branch Davidian religious cult). Subjects also have included sensitive matters such as "How the Christian Right Affects U.S. Foreign Policy," "U.S.-Iraq Relations and Economic Sanctions," "U.S.-China Relations," the "Elections in Iran," "Elections in Chile."

One recent topic discussed by two American University scholars was "The Minds and Morality of Political Offenders" – who draws the line that separates the "freedom fighter" from the "terrorist"? and when should one reject the rules of those in power and confront evil when it appears to be legitimized by a government?

The producer of *Talk to America* in English combs an array of media output daily to determine hot-button subjects. "I also put myself into the shoes of a man or woman in Botswana and decide what he or she would be interested in," the producer says. The program's largest audience reportedly is in Africa. But not for the program "Should Gay Marriages be Allowed?" It was the topic of a recent broadcast featuring both sides of this issue that is certainly an incendiary topic in some American communities.

For the people of Africa, though, even though homosexuality exists, the subject of homosexuality is an anathema. And while homosexuality is prevalent in other areas of the world such as the Middle East and in varying degrees in Asia, it's not talked about, according to experts.

The dreadlocks hairstyle was a recent topic of *Talk to America*. Two Italian-American photographers were the guest experts. If dreadlocks are your thing, fine. However, singling out one ethnic hairstyle can be perceived as racial stereotyping. Discussing dreadlocks within a broader discussion of various hairstyles around the world would avoid such a perception.

"The Slave Trade in the Sudan" and "The Condition of Women in Afghanistan" also have figured on the program. Some critics question the occasional choice of such regional topics in terms of worldwide interest. They produce parochial call-ins, it is suggested. VOA believes that regional subjects build an audience. The argument can be made that discussing sensitive or controversial subjects is an attempt to reflect American values with respect to such topics.

During two recent consecutive weeks (January 31, 2000-February 2, 2000), there were ten *Talk to America* broadcasts and only one program addressed a specific American topic: "Chinese-American Communities." For the week of March 6 no specific, identifiable American subject was on the program, but the following topics were addressed: "The Global Epidemic of Malnutrition," "Esperanto," the language spoken by two million people, "Women Make the News," a UNESCO initiative describing advancement limitations on female journalists, "Muslims Living in Western Society," the problems faced by Muslim women residing in Western cultures, and "Global Landmine Survey." All interesting subjects, but do they add to an understanding of America by non-Americans?

More specific, identifiable American topics – Americana – would support one of the objectives of VOA's able new director, Sanford J. Ungar, former professional journalist, author of several books and most recently Dean of the School of Communications at American University. Ungar has expressed his hope for "broader, deeper and more sensitive" discussion of this country on VOA. "There are a tremendous number of people around the world who want to know what is going on in this great and varied

country...If we don't do it, it's not clear that anybody else is going to do it. I hope that we will make a real push to get more Americana..."

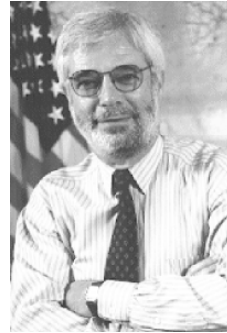
Some independent observers have misgivings about the choice of guest specialists for *Talk to America*, suggesting that the guests are largely white males drawn from think tanks and universities inside the Washington Beltway rather than representing a broader, more diverse American spectrum. But diversification of guests is very hard to attain when the pitifully small annual budget for *Talk to America* does not allow for the travel to Washington of guest experts from other areas of the U.S. To compensate, resourceful staff have guests on the show by telephone.

The annual budget for this important VOA-touted program is estimated at \$175,000, covering the salaries of four staff members and the cost of collect calls to the program from overseas listeners. *Larry King Live* on CNN has a staff of 15.

The program obviously has an audience in China though it's heard at 1 a.m. there. One of the most timely and informative programs was conducted on the day after President Clinton's last State of the Union Address in January. It drew one of the better responses – nine calls: five from China, two from Germany, one each from India and South Africa. The most frequent question: How come there was so little attention to foreign affairs in the Clinton address? There were no call-ins that day to the simultaneous TV program. A monthly health feature of *Talk to America*, "The Doctor is In," a marvelous title, is very popular, VOA says.

Without question, the concept of *Talk to America* is one of the most innovative in international broadcasting. It is the only daily international program of its kind today. The BBC has a similar program, *Talking Point*, broadcast weekly.

Even if the choice of topics on *Talk to America* occasionally might raise some eyebrows, this unique program reflects the essence of what the independent Voice of America is seeking to represent today – an American information resource to encourage the growth of democratic values, the global flow of uncensored information, and dialogue between the peoples of the world and the United States – all in the name of credibility.



Sanford J. Ungar, the 24th director of the Voice of America

About the Author

The author is a retired Foreign Service Officer who worked in the Middle East, India and Africa and was a VOA-USIA White House correspondent and a former VOA News writer. He also served as an office director in the State Department's Bureau of Educational and Cultural Affairs and as Assistant Director of USIA (Africa).

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Museum for Monitors

By Leon Fletcher

"An interactive exhibition (of) the history of maritime communications from semaphore to satellite" is how Mary Lou Herlihy, exhibit designer for San Francisco Maritime National Historical Park, describes San Francisco's newest attraction for radio enthusiasts.

By "interactive" she means there are dials you can twist, more than a dozen sets of earphones through which to hear notable radio transmissions in both CW and voice, a CW key to operate, printed informational flip charts to study, computer programs to search for specifics about historic radio, and other gear you can handle.

The ships' radio museum is on the second and third floors of the San Francisco Maritime Museum. Also in the same building: marine artifacts, models of vessels, and historic photographs.

Radio equipment on display ranges from an operating old-time "cat's whiskers" receiver – which still receives live transmissions via a crystal – to an automatic beacon called "EPIRB" – an Emergency Position Indicating Radio Bea-



Photo by Steve Danford

This grand old art-deco building, home for the San Francisco Maritime Museum, now includes the new exhibit of historic shipboard radio gear. It is located two blocks west of San Francisco's Fisherman's Wharf; plenty of safe parking is available in a large garage across the street.

con. It's about 8x5" plus a 5" antenna, floats, turns itself on when wet, and sends signals to alert rescue stations should you get in trouble when at sea.

The highlight of the display is the authentic recreation of an entire radio room of a WWII Victory ship. That "radio shack," as sailors called such a compartment, features one of the famous old reliable marine radios, the "4-U" model. That particular transmitter came from the *USNS General John Pope* (AP-110), a transport ship stored in the moth-ball fleet of old ships moored in Suisan Bay, a northern inlet on San Francisco bay.

The transmitter is a giant, extending some seven feet tall, about 12 feet in length, and three feet deep. Exhibit specialist Ghraydon Wallick, who led the recreation of the room, told me, "One of our hardest jobs was moving that big rig from the ship and into our museum."

The radio room is at the top of the stairs to the second floor of maritime museum. In the entry to the left is a display case that includes artifacts now a half-century old – "Radiograms," the forms on which radio messages were typed, some still blank, some

with messages that can be read; a set of the shoulder boards worn by radio officers as identification; glass radio tubes; even an ever-present coffee mug for the "Joe" (coffee) that kept alert many a ship's radio operators.

CW can be heard coming from the radio room. At the operator's position is an old "mill" (typewriter). In it is a partially completed message form. Lying alongside, on the desk, is a set of old "cans," (earphones).

The main exhibit of radio communications is on the third floor of the museum. Many visitors, upon stepping into this room, pause to look at the truly spectacular view of San Francisco Bay. Through tall glass windows that extend in an arc for about 180 degrees, you can see from the Golden Gate Bridge, on your left, to the San Francisco Bay Bridge, on your right. In the center is notorious Alcatraz Island, former prison for hardened criminals, now a tourist attraction. And on the wide expanse of the bay, an arriving container ship, sight-seeing boats loaded with visitors, a red-hulled pilot boat speeding out to meet the next arriving ship, commuter boats taking locals to their homes across the bay in Sausalito, tug boats pushing barges, fishing boats, pleasure boats, and more.

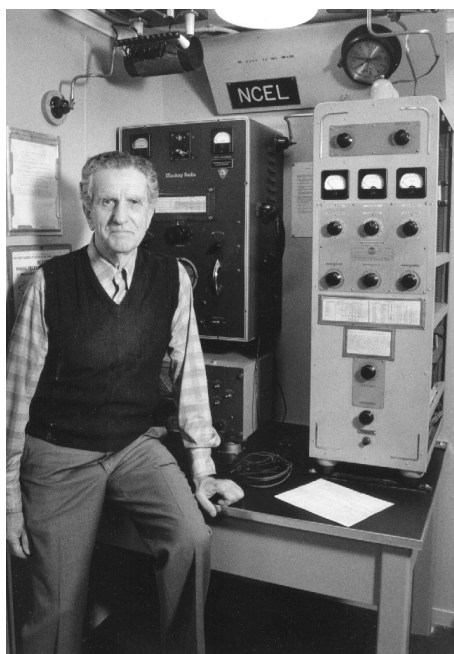
To help you identify the various types of ships, there's a flip chart with photos and brief descriptions of the most-frequently seen vessels. A telescope and a pair of binoculars are nearby.

At the center of the exhibit room, on a raised platform, is a simulation of a few essentials of a ship's bridge, including a wheel, compass, and a variety of modern shipboard communications gear – GPS receiver, VHF radio, radar, radio direction finder.



Photo by Steve Danford

This grand old "4-U" model marine radio, originally installed aboard a WWII Victory ship, is the centerpiece of the museum's authentic walk-in recreation of a shipboard radio shack of more than 50 years ago.



The sign – NCEL – over this radio gear reminded operators of the ship's call sign. Above the sign, in Morse code, are dots and dashes (- - . - . -) that spell out "THINK". That's retired radio officer John De Meo, one of the leaders in developing the museum.

All told, the radio museum includes more than a score of different exhibits. One presents the basics of signaling with flags, which the display says started in the late 18th century. A colorful poster tells the meanings of each flag, and of some combinations of flags. For example, the flag for the letter "O" means, "You should switch on your radar and keep a radar watch" – a strange mix of the ancient art of flag signaling with one of the current marvels of electronics.

Adjacent is a full-sized, 12" ship's blinker light, mounted on a pedestal as it would be aboard a vessel. It's operational; by moving a lever, you can open and close a Venetian blind affair that reveals or hides the light so Morse code messages can be sent. Such lights were first used in 1867, according to the exhibit.

Another display points out that "as early as 1904, Navy radio offered weather" information to ships off the West Coast.

Then there's an INTEL 1486 microprocessor that includes more than 7.5 million transistors, shown under a magnifying glass so you can see it in detail. Another exhibit tells visitors about GMDSS – Global Maritime Distress Satellite System – established in February 1999. Operating on the traditional emergency frequency of 500 kHz, it's a group of systems, controlled through one console to provide

communications, navigational information, and automatic distress signaling. The exhibit points out that one major, persistent problem in previous self-operating emergency radio systems was that they often sent many false signals; this system is claimed to have "so many back-ups" that unnecessary calls for help are "virtually impossible."

Brief biographies with short audio tapes you can listen to, answer the posted question, "Who were the 'Sparks?'" That's the nickname for shipboard radio operators. Representative was Richard Johnstone, who went to sea, the display says, in 1912, when he was 17 years old. Another is Bobby Kahn, one of the first woman radio operators aboard ships. On an audio tape, she tells about her years, starting in the early 1980s, as a merchant mariner.

There's a shortwave radio from which you can select six live transmissions for listening, including spy stations, data transmissions, and the BBC's program "World Today."

On a computer you can bring up information about maritime communications, Coast Guard activities, current news, weather, and more.

A special exhibit commemorates the first use of wireless on the West Coast, August, 1899. That was when the San Francisco lightship used a Ruhmkorff spark coil to report the arrival of the troopship Sherman. Ashore, at the Cliff House, the message was heard on a coherer receiver that was much like Marconi's.

Another display points out that just 13 years later, as a result of the loss of the *Titanic*, the Radio Act of 1912 was passed; it required every ship to have three radio operators aboard to maintain an around-the-clock radio watch.

The last CW maritime transmission was sent over KFS on July 12, 1999, by station manager Tim Gorman. One of the museum's exhibits lets you listen to his message. It included the same



Some exhibits let you look inside old-time radio gear, operate them, and listen on headsets to recorded transmissions. Seen in the distance are some of the museum's ships that you can board.

words Samuel Morse sent on his first transmission, "What hath God wrought."

Covering the "100 Years of Radio – 1895-1995," the San Francisco Maritime National Historical Park is one of the best historic presentations I've seen on any topic. It's comprehensive yet not overly-detailed; it's clear and specific; artifacts are diverse, intriguing, selective; material is not crowded together. In sum: it's a joy to view.

It's important to note that despite some printed and online articles about the exhibit, it is a permanent display, planned to be on view from now on. That point needs to be emphasized because some announcements about it say it's "the current exhibit," and others imply it's available during last February only.

The importance of this museum in preserving the rich history of shipboard radio is effectively emphasized by former radio officer John De Meo. In the 1950s, he'd served aboard the *Pope*, the ship from which the exhibited radio shack came. Now, in one of the tape-recordings you can listen to at the museum, he says, "The (shipboard) radio operator was a true link to the outside world and the entire crew depended on his service for peace of mind."



On this recreation of the essentials of a ship's bridge are some of the displays that include earphones visitors can use to listen to a variety of live transmissions and recorded information.

Nearby, Associated with the Museum

Historic ships: including the square-rigged *Balclutha*, lumber schooner *C. A. Thayer*, scow schooner *Alma*, sidewheel ferry *Eureka*, British paddle tug *Eppleton Hall*, Liberty Ship *Jeremiah O'Brien*, submarine *Pampanito*, and others. Open daily. Fee to visit.

Marine store: extensive selection of books about the sea, plus models, ship plans, posters, videotapes, etc. Open daily. Library: 12,000 books, 120,000 sheets of ship plans, 250,000 historic photos. Not a lending library; materials must be used on site. Open Tuesdays thru Saturdays, various hours; for specific times, phone (415) 556-9870.

Workshops and classes in making oars, models, boat preservation, etc. Scheduled. Fee.

Tours of ships, both topside and interior and engineering spaces. Scheduled. No fee.

Music of the sea, including chantey singing, fiddle playing, etc. Scheduled. No fee.

Plus lectures, films, costumed events, etc.; for schedule, phone (415) 556-6434.

Essentials

Location: Foot (bay side) of Polk Street, 3 blocks west(seaward) from Fisherman's Wharf.

Hours: Open daily, 10am - 5pm.

Fee: None.

Getting there: Driving: head for Fisherman's Wharf, at north central edge of San Francisco, on the bay; follow directional signs posted around the city that are orange with white symbol of a crab and say "Fisherman's Wharf" with an arrow below.

Public transportation: plentiful; for information, phone (415) 673 MUNI.

Wheelchair accessible: ramp entry; elevator. Phone: (415) 556-3002.

Online: <http://www.nps.gov/safr/> or enter "San Francisco Maritime Museum" in a search engine.

Parking: Large garage, across the street, within half-block. Dining: Many restaurants nearby, offering food from modest snacks to luxury feasts.



Photo by Steve Danford

A telescope helps visitors get close-up views of the variety of vessels on the bay. Earphones are available for listening to live radio transmissions from some of the many ships and boats that can be seen from the museum's wide expanse of windows.

About the Author:

Leon Fletcher has had four articles published previously in *Monitoring Times*; most recently: "Marconi's California Stations," November, 1997. His publication credits include 800+ articles and 16 books, including *How to Speak Like a Pro*. He is on the air as AA6ZG, holds an extra (most advanced) class amateur radio operator's license. E-Mail: LeonFlet@aol.com.

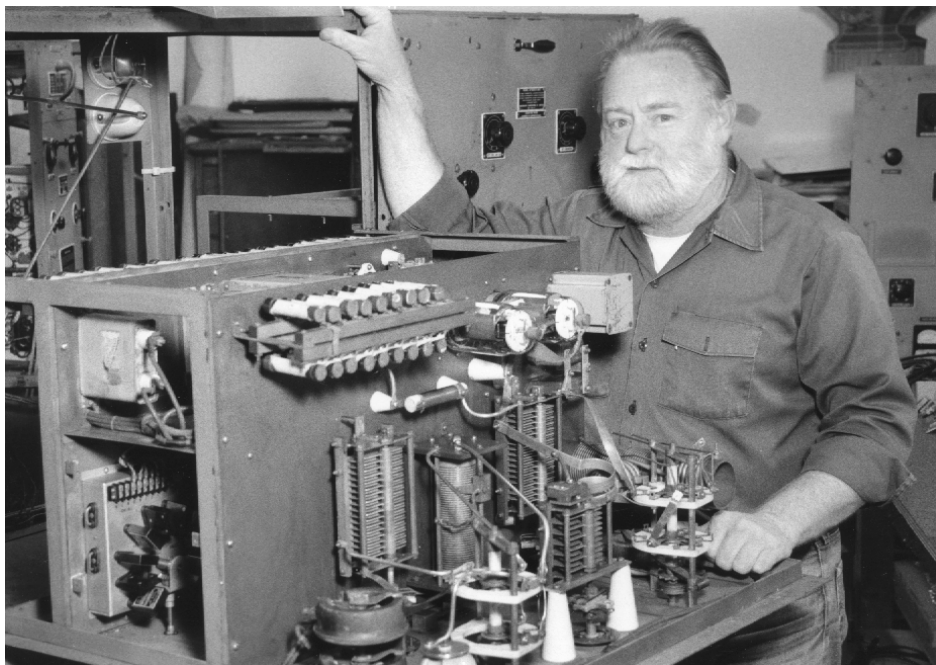


Photo by Steve Danford

A WWII Victory ship used this radio that is now on display at San Francisco's maritime museum. Volunteer Tom Horsfall led the restoration.

Bring in those FM stations when you Build This Budget FM-DX Antenna

By Ken Reitz KS4ZR

In case you hadn't noticed, a lot has changed on America's FM radio band over the last ten years. Up and down the band stations are wedged tightly together; the proliferation of translator and booster transmitters have sucked up the few remaining frequencies; and sound-alike formats have helped to give a monotonous familiarity to the programming. It's hard to imagine that FM pioneer Edwin Armstrong would have approved.

Ten years ago in my location, within 100 miles of Washington, D.C., it was possible to tune in virtually any D.C. FM radio station using a TV antenna with a rotator and a booster amp. Though the signals were subject to the vagaries of the band and season, I could still count on listening to some of the most interesting FM programming in the country.

But, a funny thing happened on the way to the new millennium. The sleepy "public broadcasting" portion of the band became a new frontier for well financed religious broadcasters and non-commercial stations, seeking to expand their fund raising territory. These latter stations have snatched up available frequencies in lucrative non-coverage areas to set up "milking operations" via their translators. Now, the side lobes from nearby translators and start-up stations on previously listenable frequencies has made listening to D.C. stations all but impossible. There had to be a way to retrieve the DX stations.

Digging for DX

FM DXers are interested in tuning distant FM signals either through the capabilities of their receiving systems or through the happenstance of tropospheric ducting. Of the two, FM DX skip is the least predictable and certainly not dependable. But, when it happens it's a lot fun. What I needed was a system with enough gain to pull in lower powered FM signals from 90 miles away; a narrow enough beam width to avoid picking up stations on the same frequency off the side of the antenna; and still be reasonably priced.

As with any other reception endeavor the components of this system are critical. There are basically three parts: the antenna, the receiver and the feed line which connects the two. If you have a terrific antenna feeding a poor quality receiver the results will not be satisfactory. The same is true if you have a fabulous receiver and are using a poor antenna. Your receiver must be up to the capabilities of your antenna. As to feed lines, in the case of FM DX there is not much choice in antenna feed line since most fittings are for 70 ohm coax cable. Be sure to use RG/6 coax as it exhibits less than half the loss per 100 feet of run than RG/58 coax at FM band frequencies.

Assemble stacked Yagis on level ground. Use a tape measure to make certain the booms are parallel. Sight along each element set to ensure they are parallel as well. Tighten the boom clamps (measure again), secure each end of the phasing lines to its respective balun and attach to the bi-directional coupler. Taking this assembly to the roof should be a two person job.

For decades hams have had success in weak signal work using bays of stacked Yagis for transmitting and receiving. Working in the 2 meter range (144-148 MHz) for Earth-Moon-Earth transmissions hams often use elaborate (read: really expensive) antenna arrays. We don't need anything nearly so elaborate for FM DX, but it gives us an idea for system design.

There's a long history of stacking antennas in TV reception. Before the popularity of the Yagi or the Log Periodic Dipole Array (LPDA) now used for off-air TV reception, simple dipoles with reflectors and directors were often stacked in rural locations to enhance reception. The cable-TV industry has taken advantage of the stacking concept for decades in providing subscribers with distant TV and FM reception. In fact, it's to the cable industry that I looked for a solution to my

particular reception problem.

Long before there was an HBO or TBS, cable systems were called Community Antenna Television (CATV) and that's exactly what they were. Instead of everyone needing to put up a big antenna, households could subscribe to the services from the community antenna. CATV systems set up a VHF/UHF/FM antenna farm, usually just outside of town. The arrays of stacked antennas were pointed at the various nearby cities and the feeds were collected at the "headend" where signals were split and processed for distribution via low loss coaxial cable to subscribing households.

Designing Your Own Array

You can design a stacked array for virtually any reception interest. But, the higher the frequency the easier (and cheaper) the stacked array becomes. Setting up for a UHF-TV-only stacked array, for instance, would take up very little space and be relatively economical. Similarly, stacking VHF or UHF vertical antennas for scanning purposes would be easy to do and very effective.

There are limitations on building an array for FM DX which should be pointed out. If you live in an area with powerful nearby FM radio stations, a stacked array may not be very satisfactory at all. You could simply end up overloading your receiver's front end. Furthermore, don't expect miracles. Antenna gain or reception distance figures cited by manufacturers are theoretical at best. Most of us will have to deal with the hilly terrain and nearby buildings of our non-theoretical world.

Stacking two Yagis is common in the cable-TV business and combining two stacks to make a quad array is also standard. But, stacking more arrays together adds more weight and insertion loss than the extra signal gain would warrant.

Similarly, height is a big component in increasing signal reception. According to Frank Baylin's *Wireless Cable and SMATV* book, doubling the height of an antenna is equal to 6 dB gain in the VHF band and 12 dB in the UHF



Attach feed line from receiver to the bi-directional coupler. Cover all "F" connectors with silicon or Coax-Seal® and lash the connector to the mast. When installing the feed line into the house, make a drip loop to prevent rain leaking into the house.

band if the starting height is greater than 3 wavelengths above ground. However, the expense of the additional tower and feed line has to be considered in determining if it's worth the extra gain.

In designing an antenna system specifically for the FM band we're interested in only the 88-108 MHz portion, so it's advantageous to use an antenna cut to those frequencies. Using a VHF-TV antenna is acceptable, but doesn't offer nearly the capabilities of an FM-specific antenna. The Yagi antenna design has worked extremely well as an off-air antenna for the VHF-TV/FM frequency band. It offers excellent gain, reasonable side-lobe rejection and relatively simple construction.

Selecting an Antenna

It could be that, with the proliferation of DBS satellite TV, listening to off-air FM radio is not that popular any more. FM-only antennas at reasonable cost are not easy to find. The two major brands, Channel Master and Winegard, both make and sell FM-only antennas but at premium prices. Radio Shack sells a six-element Yagi antenna cut for the FM band and it's this unit which I have used for this project because it's inexpensive (\$20 in the store). However, this has become a problem in itself as this product is not

available either on-line (www.radioshack.com) or via their 800 service (1-800-THE-SHACK). It is available through local stores, although of the three stores in my area only two antennas were available. I have found one dealer, which I have listed in the "sources," who will sell the items necessary for this project: two FM Yagi antennas, two four foot phasing lines, and one bidirectional combiner in a package shipped UPS.

The Radio Shack "High-gain directional FM-stereo antenna" (cat.#15-2163) features six elements, one reflector, two directors and three elements configured in a Log-Periodic style triple driven element. There are no gain figures given, but the overall dimensions are a boom length of just under 6' (70") and longest element length 66". The elements themselves are the type found on most Radio Shack antennas designed to fold out and snap into place and the boom is a 1" square of aluminum. This antenna is 300 ohms and outfitted with terminal screws on each side of the driven element. 300:75 ohm baluns must be added to connect the coax to the bi-directional coupler. The output of the coupler is fed via coax to the receiver.

Both antennas should be spaced half a wavelength apart (about 5-1/2 ft.) on the mast. Since most masts are 5-ft. in length you'll need two masts to get the proper spacing. While it's preferable to mount the mast as high as you can above the roof it may not be

practical given your own circumstances.

Other considerations are to add a rotator to take full advantage of antenna direction. If your requirements are to receive stations only in one direction you can dispense with the rotator and save about \$70 on the installation. Adding mast mounted pre-amps are not possible using normal splitter/combiners as they will not pass the voltage needed to power the amp. I've tried adding a preamp at the receiver end, but the effect was negligible on the best receivers and simply overloaded the poorest ones. Anyway, the point of this whole antenna system is that it can be built for the cost of a mast mounted preamp alone!

Tuning in the Real World

After assembling the two FM Yagis, mounting them on the mast, attaching the baluns and the phasing lines, I mounted the array on a pre-existing gable-end antenna support. Attaching a length of RG/6 cable to the output of the combiner, I ran the coax to the input of an FM radio. Actually I had several radios lined up for experimenting. First was the Bose Wave® Radio, second, the Uniden 2021 portable shortwave radio which also covers the FM band and, third, a pricey Kenwood stereo FM receiver.

To start the festivities I tuned to the frequencies I had targeted for this project. 88.5 MHz, the frequency for WAMU in Washington, was dominated locally by a translator from WVTF Roanoke. Without any antenna WVTF came in with a stereo signal. I slipped the end of the coax into the "F" fitting on the back of the Bose and instantly WVTF disappeared and WAMU came



Looking up at the stacked Yagis notice that all elements and the booms are parallel, mounted on the same side of the mast and facing the same direction!



Finished assembly mounted on the mast at the peak of the roof. This installation, without a rotator, is designed to pick up stations in one location. Adding a rotator adds to the versatility of the system, as well as more than doubling the cost.

in with a clear, albeit mono signal.

Next stop was 90.9 MHz, WETA-FM from Washington, which is just .2 MHz up from another translator from WMRA Harrisonburg. Again, no problem. Only this time WETA, a stronger station than WAMU, was able to light the Bose "stereo" LED.

So, what about all the other stations in D.C.? I went to the FCC's web site and pulled a list of all of the FM stations actually located in D.C. With the antenna unplugged I tried to tune them in. Zero. Zilch. Nada. Attaching the stacked Yagis I could pick up nine of the 13 listed. Three of those which I couldn't get were squarely on the frequencies of local powerhouses.

The next step was to see how the stacked Yagis compared with a larger, more expensive, amplified antenna on a rotator. I swung the VHF-TV LPDA to D.C. and plugged in the amplified coax. Tuning for the same D.C. stations on the Bose I could get just six of the 13. The unamplified stacked Yagis outperformed the amplified, LPDA VHF-TV antenna.

Finally, I plugged in the Kenwood and found it performed no better than the Bose. The Uniden performed nearly as well as the Bose, but an old analog dial tuned receiver failed to tune much of the list because of its inability to separate channels.

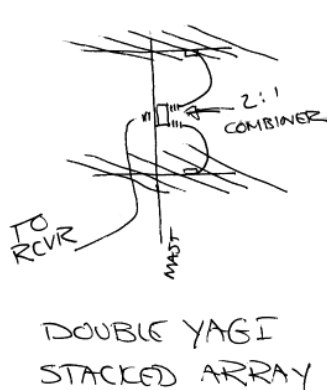
Only the Beginning

This project could be just the beginning. If you're thinking about stacking Yagis try the stacked quad. Remember that by stacking two Yagis you get a doubling or 3 dB gain and connecting two stacked arrays for a quad will give

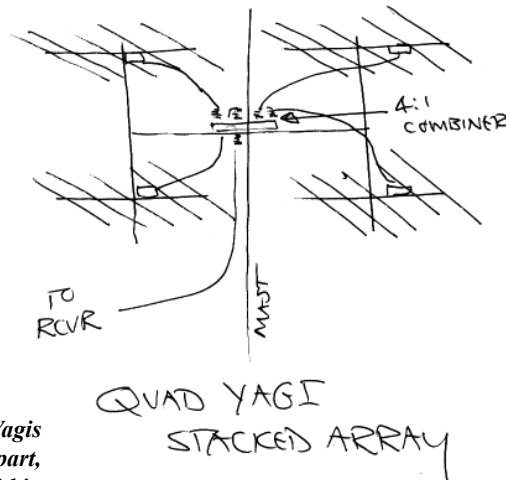
you up to 6 dB gain. If that works well why not go for additional bands? A quad stack for the UHF-TV band would be really interesting. CATV systems even use the quad stack for VHF-TV channels. Common practice in the CATV field is to have antennas cut for specific channels.

Another thing to consider is stacking the Yagis in the horizontal plane. This is not nearly as convenient to mount and requires a bigger turning radius because the ends of the elements need to be nearly a wavelength apart. But, the advantage to horizontal stacking is improved directivity.

Once you've started in on this project you may have more questions and need more infor-



Stacked FM Yagis with phasing harness. Yagis should be at least half a boom length apart, phasing lines should be the same length within 1/2 inch. Entire system should be at least 3 wavelengths above ground level.



mation about the world of VHF/UHF DXing. The Worldwide TV-FM DX Association (WTFDA) has a web site just packed with interesting information on this subject (see sources below). You may also want to check out their publication *VHF-UHF Digest*.

Like any true DXer, I can't be satisfied with the system as it is. I'm already thinking about trying to get stereo signals from those D.C. stations, and then there's the idea of UHF-TV. There's a world of great UHF-TV stations in D.C. If I can just get enough height on a quad stack of UHF-TV Yagis....

Sources:

Worldwide TV-FM DX Association (WTFDA). Publishes the *VHF-UHF Digest*. Excellent web site has links to many great sources of related information. P.O. Box 501 Somersville, CT 06072 Web site: www.anarc.org/wtfda

Showtronics Radio Shack Dealer. Sells the six element triple-drive FM antenna used in this article. Package includes 2 antennas, phasing lines and bidirectional coupler for \$57.99 UPS shipping included. Orders only: 800-967-1626 Tech line: 540-967-1626.

Wireless Cable and SMATV by Frank Baylin and Steve Berkoff, 1992 Published by Baylin Publications 1905 Mariposa, Boulder, CO 80302 303-449-4551. 386 pages \$50. Web site: www.baylin.com

SNEAK PREVIEW

Grundig Satellit 800 Millennium

By Bob Grove, W8JHD



Grundig's premature announcement of their impending Satellit 800 Millennium super receiver caused quite a stir among shortwave listening enthusiasts. For some six months, dealer telephones have been besieged by prospective customers asking where their receivers were. But the wait is over, and the receiver is here to be judged.

An international effort (designed with licensed technology from R.L. Drake – most notably the successful SW-8 – but manufactured in China by the famous German manufacturer Grundig), the 800 is a big radio. A *big* radio, similar at first glance to the legend boom boxes of the '80s. Measuring an astonishing 21" wide by 9" high and 8" deep including knobs and handles, that's significantly larger than any communications receiver produced for the domestic market in recent times.

But at 10 pounds (less AC adaptor and batteries), its plastic cabinet has a weight advantage over heavy-duty communications receivers like the Icom R9000.

Frequency coverage is 100 kHz-30 MHz, 87-108 MHz, and 118-137 MHz. Frequencies may be directly keyed in on a large keypad.

The 800 is a double conversion superheterodyne (single conversion on FM), with intermediate frequencies at 55.845 MHz (up-conversion) and 455 kHz (10.7 MHz on FM). Image rejection is typically 60 dB, very respectable for this price range. IF rejection at its conversion frequencies is 80 dB, also quite good.

Frequency stability is +/- 100 Hz from 0 to 50 degrees Celsius (32 to 122 degrees Fahrenheit), and readout accuracy is better than 100 Hz at room temperature.

Control Panel

Naturally, such a large panel area affords considerable room for controls and dials. No one will ever complain that the 800 is cramped for space! The giant, backlit LCD window (6-3/8"W x 2-3/4"H) allows huge, 3/4" high, numeric readout for frequency, time, and channel number. No

trouble seeing Deutsche Welle's frequency – it's over 3" long!

Other function callouts are mode (AM, AM SYNCH, USB, LSB), band, filter bandwidth, meter band, AGC speed (slow, fast), attenuator, memory channel, and scan.

Similarly, wide spacing and wide buttons are utilized for function keys, typically 5/8" across and center-separated by an inch or more! And the illuminated S meter is proportionately large as well, 2-1/2" diagonally. The S meter is conventionally calibrated in signal strength units 1-9, then decibels above S9 to 60 dB. Oddly, Grundig specifies 5 dBs per S unit, while standard convention is 6 dBs.

For those that like a keypress "beep" signal – and for those that don't – a key allows that choice. And speaking of keys, we noticed occasional keypad "bounce" – double-stepping from one press, probably due to slight finger movements which are read as two presses. This is software-addressable, and may have been a fluke with our review unit.

Power Requirements

The 800 is powered by a nominal 9 volt at 510 mA (830 mA with lamps on) DC source; this can be from the 120/240 VAC autoswitching adaptor (provided), or six D cells (not provided). It is unfortunate that a conventional 12 volt supply was not specified which would have allowed convenient mobile and customary emergency portable operation. A conventional coax-style DC connector is mounted on the rear apron.

Antenna Selection

A 57" telescoping whip may be extended for shortwave, aircraft, and FM reception; alternatively, a standard SO-238 and TV-style F connector are available on the rear apron for external antenna adaptation. Push terminals are also provided for random wire antennas or balanced feedline.

Medium wave broadcasts are acquired by an internal ferrite-loop antenna.

Audio Quality

Separate bass and treble controls, a 4" internal speaker, a 2-watt audio amplifier, and a choice of three IF bandwidth filters (AM/SSB) promise good sound options. Stereo FM is available on the rear apron; a 1/4" jack allows headphones (stereo padded headset included) or external speakers to replace the internal speaker, and two RCA jacks offer line output (300 mV @ 4.7 k ohms) for recording.

While more bass might be expected from such a volumetric enclosure, and the enormous front grill belies the actual size of the 4" internal speaker, the FM sound is quite good – crisp and transparent. AM and shortwave fidelity is naturally more limited because of bandwidth restrictions, co- and adjacent-channel interference, selective fading, and quality of the originating transmission.

But audio quality is quite subjective, a matter of personal preference. In our opinion, the 800 does measure up to any of its competitors, and is superior to some.

Squelch

Scanner enthusiasts are well acquainted with squelch; it cuts off the audio between transmissions to avoid the listening fatigue which comes from having to endure all that background hiss. The same sort of relief can be enjoyed on shortwave as well, and manufacturers of high-end FM stereo receivers include "mute," just another name for squelch, to quiet the receiver when the user is tuning between stations.

Unfortunately, the squelch on the 800 only works on the air band; too bad, since it could have been left in the circuit for FM muting and AM/SSB quieting at the option of the listener.

Sensitivity

Weak signal sensitivity of the 800 is excellent, profoundly so on FM where the whip antenna significantly outperforms many over-the-counter FM portables. The manual specifies the

FM sensitivity at 4 microvolts, leading us to wonder what the sensitivity of the competitors must be!

From 100 kHz through 30 MHz, SSB sensitivity is 0.5 microvolts, right up there with the best of them. The good news for medium wave DXers is that full sensitivity is retained in the AM broadcast band, a rarity even among communications receivers. Of course reception is limited by the internal loop antenna, but the simple expedient of using an optional air-coupled loop like the Select-A-Tenna should really keep things hopping on medium wave!

Selectivity and modes

On AM and SSB modes, three filter bandwidths are available: 6, 4, and 2.3 kHz. Because of the wider bandwidth requirement of AM, the 2.3 kHz filter is much too narrow on that mode – audio becomes muffled, losing its high frequency (“treble”) components. But the 6 and 4 kHz filters are good choices for AM, and any of the three filters can be selected for SSB.

Assuming that the S meter is reasonably accurate for our measurements, the printed specifications seem right on target. The –6 and –60 dB points for the three filters are 6/12 kHz, 4/9 kHz, and 2.3/5 kHz. While there was slight pass-band ripple on the two narrower filters, it won’t affect reception, and selectivity skirts were quite respectable for a receiver in this price range. All three filters produced excellent unwanted side-band rejection.

We found the IF alignment to be right on target; when the modes were switched between AM and USB or LSB, voices and music remained quite natural, on pitch. Very unusual for any low- or mid-priced shortwave receiver.

Only one filter bandwidth – 150 kHz – is available for the FM broadcast band, but that’s to be expected, and it’s adequate for separating the majority of adjacent-channel signals.

Tuning steps

Four bands – aircraft (118-137 MHz), FM (87-108 MHz), shortwave (1800-30,000 kHz), and AM (100-1790 kHz) are sequentially pushbutton-selectable.

A 1-3/4” manual tuning knob is knurled on the edge for better grip during fine tuning, and a finger dimple permits convenient spinning of the dial. A pair of UP/DOWN keys permits more rapid frequency hopping for band surveying.

On VHF air band, the tuning keys permit appropriate 25 kHz step intervals, while the manual dial allows a much finer 100 Hz step, quite unnecessary for this frequency range. 1 kHz would have been fine enough, and more practical. In actual practice, however, fine tuning is virtually never required in the aircraft band where 25 kHz steps are still the standard spacing, although 8.33 kHz is coming into play in Europe.

FM intervals are 100 kHz for the key steps, and 20 kHz with the tuning knob; again, this fine tuning is unnecessary on a band where sta-

tions are on standardized intervals, channels are very wideband, and the FM capture effect makes fine tuning useless.

Shortwave tuning, however, does benefit from the factory-programmed step intervals. The 5 kHz AM international broadcasting band plan is stepped by the keys, and the 50 Hz fine tuning steps of the manual dial clarifies single side-band reception.

Similarly, medium wave AM tuning is appropriately 10 kHz (9 kHz for Europe) on key steps, and 100 Hz with the knob.



How does the Grundig stack up against the Sony 2010? Well, it's definitely bigger! ...but there's more.

Memory

Up to 70 memory channels may be stored in seven banks along with frequency, mode, attenuator, AGC, and bandwidth. The memory channels may be manually scrolled with the tuning knob, or automatically scanned by a key press, in which case each channel will be sampled for five seconds before stepping to the next.

Memorized channels may be temporarily skipped or permanently erased by a key press.

Synchronous Detection

While old-time shortwave aficionados may scoff at the advantages of synchronous detection, it does serve an admirable purpose. When band conditions become unstable, selective fading may cause considerable distortion on an AM signal. Selectable sideband synchronous detection automatically locks onto the carrier frequency of the signal, and may be adjusted to receive either sideband. This provides immunity from selective fade distortion, and the ability to select the sideband least likely to be suffering interference from an adjacent frequency signal.

Along with this comes another advantage, the ability to choose the sideband of an AM signal which is least suffering adjacent frequency interference.

The synchronous detection design of the 800 is excellent, superior to many competitors which permanently lose lock when the tuning dial is tweaked for best reception. During our tests, the Grundig design locked on with excursions of some 3 kHz or more from center carrier frequencies, even in crowded band conditions!

Dynamic Range

The ability of a receiver to handle very weak and very strong signals equally well is a measure of its dynamic range. The 800 fares very well in this department.

The third-order intermodulation specification is +10 dBm with 100 kHz signal spacing, and –20 dBm at 5 kHz. Considerably better than other portables in the several-hundred-dollars range.

What this all means is that even with an external antenna connected, virtually all of the signals you hear are supposed to be there! During our tests, we detected no spurious signals from strong-signal overload. But just in case, the 800 offers an attenuation switch of approximately 20 dB which can be used on all frequencies below 30 MHz.

A Busy Clock

A dual-time, 24 hour clock provides a two event-timer function which can switch between two memory locations to switch a program on and off at the appropriate time.

The Bottom Line

No receiver is going to make everyone happy. The 800 will be too large for some, and we won’t know until actual production how many of the rough edges discovered on our pre-production model have been honed down.

Our early sample exhibited more than its share of spurious, self-generated, synthesizer signals (“birdies”) on every frequency ending in 54.6 kHz throughout the medium and short-wave bands. Others showed up sporadically, some minor, some severe. Globes of spurs interfered with low frequency reception below the AM broadcast band.

An irritating strobe pulse rendered a signal on 88.1 MHz FM unlistenable, and synthesizer noise caused interference from 95.9-96.2 MHz as well. Similarly, aircraft band tuning is marred by a barrage of spurs, mostly on tuning-dial-selected frequencies.

The display curiously reads “LISB” for “USB” when that mode is selected, probably a layout error during the initial artwork for the LCD panel, and that minor gaffe will remain in the production units.

We still rate the new Grundig Satellit 800 Millennium as outstanding in its price class. Its audio quality, selectivity options, overall sensitivity, ease of operation, and readable display panel should all contribute to customer satisfaction with this product. And if Grundig manages to suppress the self-generated spurs, the 800 will prove an unusual value.

The Grundig Millennium Satellit 800 is available for only \$499.95 plus \$18 shipping from Grove Enterprises, PO Box 98, Brasstown, NC 28902-0098. To order call (800) 438-8155, or fax (828) 837-2216. Available on-line at www.grove-ent.com/RCV33.html.

The Science Fair Crystal Set

Anyone out there in *MT* land who has ever been a parent knows there are certain milestones in a child's life that are to be cherished. For many folks, the first word, the first steps and, much later, the first call home from college asking for money are moments that remained etched on the mind and the heart. But to your humble radio hobby curmudgeon, all these tender moments take a back seat to that moment when your kids comes up to you and says "Dad, I need to do a Science Fair Project!"

Such was the case when Number Two Son came down into Uncle Skip's basement RF laboratory. Why, I had even been keeping a whole parts drawer full of 1N34 diodes handy for just this magic moment. With just the slightest hint of tearful pride leaking from the corners of my eye sockets I said "Why don't you build a crystal set?"

The basic crystal radio not only makes for an excellent science fair project but it can serve as the foundation for any young person's entry into the whole world of radio. More than a few of us old timers and older timers had our first significant radio monitoring experiences thanks to little chunks of Galena crystal and wire "Cat's Whiskers." There are probably a few folks reading this column today who can remember a time when ALL personal radio listening was done with crystal sets.

Even though we live in a world of inexpensive, microminiature, surface mount, solid state componentry, there is still a lot of wonder to be found in that most basic of radio receivers. Just say to a young person that it is possible to build a radio that doesn't need batteries, line voltage, solar cells, a wind-up crank or any other source of power and I'm sure you'll get at least a raised eyebrow.

◆ Making the pitch

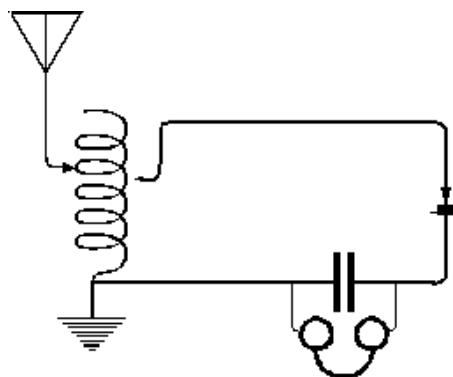
First, though, it's helpful to have a good "short version" of the engineering involved. Remember, we are working with kids raised in a world that rewards the three minute attention span.

Radio signals are all around us. These electromagnetic signals are commonly called RADIO WAVES. Radio Waves simply need to be captured and then changed into something we can understand. In the case of radio, this means something we can hear (audio). The most basic crystal set consists of an antenna wire to capture this electromagnetic energy.

This is usually followed by a coil of wire that is "tuned" by changing its electrical length

to select a particular radio frequency. This can be done by tapping the coil at various places along its length or adjusting it by use of another electrical component called a CAPACITOR. This capacitor can have either a fixed value or it can be adjustable. Together, the combination of coil and capacitor is sometimes referred to as the "Tank" circuit.

This coil (and capacitor) is then connected to the DETECTOR. In the good old days of early radio this was done by probing a piece of crystal (usually Galena, but Quartz and Carborundum were also common) with a small, thin wire that was known as a "Cat's Whisker." A sensitive spot on the crystal's surface was touched and a process known as RECTIFICATION occurred.



Most modern experimenters take advantage of a device called a DIODE to perform this step of the process. In the case of the common 1N34, the material inside the diode is Germanium. If you were able to break open such a diode without damaging its internal structure ... (if you figure out how to do it, let me know: I went through about a dozen trying) ... it would look very much like a small crystal tapped with a wire "Cat's Whisker."

The magic we call radio happens at the junction of the detector where rectification occurs. The Detector is the place in any radio, from the simplest crystal set to the most advanced multi-megabuck receiver, where those radio waves are converted (rectified) into an audio signal that, in the case of a crystal set, can be heard in earphones or with more advanced receivers, is further amplified, modified and processed.

Even a simple modern radio receiver will often contain dozens and dozens of solid state electrical components. A crystal set contains only one! And that single part gets all the electrical

energy it needs to operate right from the electromagnetic radio wave itself, requiring no other sources of power.

Pretty neat, huh? Armed with that little bit of information and a quick trip to your local electronics supply store, you could start experimenting with receiving Radio Waves. Science fair, here we come!

◆ An old radio in a modern world

Now, playing with ancient radio design doesn't mean we can't take full advantage of what the modern world has to offer to bring the crystal radio experience alive. And I'm talking about a lot more than the ready made detector in the form of the 1N34 diode, too. In the spirit of all those teachers I confounded through my youth, who told me in exasperation "Go look it up!" I first sent Number Two Son off to the Internet to do a bit of searching. I already had several sites devoted to crystal sets book-marked, but I did not want to deny my son the joy of the hunt.

Probably the best site you can find on the Net to pursue this topic and its implications as a science fair project is www.midnightscience.com. This is the home of The Xtal Set Society, a nice group of folks (including Old Uncle Skip) who have joined together to celebrate the joys and wonders of crystal radios.

Exploring their home page will reveal a link to a whole section of information about Crystal Radio Science Fair Projects. In this section you will find an excellent design for a classic "Quaker Oat Box" radio – probably the oldest receiver design in continuous use since the days of Marconi. The society has laid out all the information about parts, construction and use of this basic crystal set. This makes it very easy for a parent who may not have a great deal of radio knowledge to help their young person get things going in the right direction.

Beyond the trip to Radio Shack to purchase a few parts and some wire, you and your family need to eat your way through a box of oatmeal. (Hey, it's good for you!) I went on a bit of a quest to find alternatives to the oatmeal box. I came up with a neat alternative that can be purchased at most any hardware store. The oatmeal box serves as a five inch diameter coil form. My alternative was a PVC pipe coupler that also had a five inch diameter. My son and I decided to go this route because it should prove to be more durable in the highly jostling world of a science fair.

One part you will need to acquire by mail-order. Crystal receivers require a HIGH IMPEDANCE earphone, usually on the order of 2000 to 10000 ohms or more. Such earphones used to be fairly commonplace but modern electronic equipment almost exclusively make use of very LOW IMPEDANCE earphone designs in the neighborhood of 4 to 8 ohms. Quite a difference to be sure!

The fact is that the low impedance ear pieces simply won't "hear" anything when used in a crystal set design. You can do some electronic juggling with transformers and such, but that would take the project too far from its original intent as a simple science fair presentation.

Radio Shack used to carry high impedance earphones, but they are no longer a stock item. High impedance earplugs can be purchased from Mouser Electronics 1-800-346-6873 www.mouser.com look for part number 25CR060. High impedance earphones can also be purchased directly from The Xtal Set Society. Check their website for further details. Since these have become harder and harder to find I always keep a few in the junk box for future projects. (Hey, I might have grandkids someday, right?)

Another thing that you need to consider to make a crystal set work is a good GROUND

connection. This can be either in the form of a connection to a cold water pipe or a ground rod driven into the ground. As science fair projects go, this is the biggest hassle. You need to talk to the teacher or the school authorities to make sure you can set your receiver up near a sink or water fountain.

While you're at it, you will want to also be near a window to get the antenna out where it can be free of some of the human-made noise that any modern school building is sure to generate. Be careful to route your antenna away from all power lines to avoid the chance of any shock hazard. Remember that you should completely disconnect any outside antennas and route them away from the building to a good ground when not in use to avoid any problems with lightning or static discharge. And, of course, never use this or any other electrical equipment in the presence of an electrical storm.

You will find this little bit of extra effort is well worth it. Kids get a real kick out of a working crystal set. You can challenge them to "Find the battery."

◆ Find your own variations

You can use one of the designs shown on the Xtal Set Society's page directly with good

confidence or you can also find designs in books at the public library. There are dozens of crystal set designs around. The Xtal Set Society even publishes a monthly newsletter outlining easy to follow plans to build these designs. They also publish a series of books on the subject.

If you remember the basic structure I talked about earlier – antenna, coil (and capacitor), detector (diode), earphone and ground – you will see that it serves as the foundation of all the variants in the world of crystal set design. As a matter of fact, once you have your basic crystal set working, it can be fun to adjust and modify the set design to see what happens. I've built sets where I have connected the parts together with alligator clips to allow for experimentation with different coils and capacitors to achieve different results. Want to hear shortwave instead of broadcast band AM? Shorten the coil. It's that simple. There is a lot of room for experimentation with crystal set design.

And the best thing of all is that you and your son or daughter have begun to work together on building a future shared in the greatest hobby of all: radio monitoring. After the science fair is over, bring the crystal set home and try to see how many stations you can hear with it. Read a few books on the subject and see how you can improve on the design.

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Q. I would like to connect my computer's stereo speakers to a scanner as well as the computer with a simple Y adaptor. Is this feasible? (Jeff Newton, e-mail)

A. It sure is. Just to be safe, using a DC voltmeter, test the outputs from the external speaker jacks of both the computer and the scanner. If there is no voltage present (a trace is probably OK), and you aren't running the scanner at full volume, you shouldn't cause any harm to either device.

If there is a voltage present, you should place a 470 microfarad, 16 volt capacitor in series with the center wire from that jack to protect the output circuitry of the other device. Purists would say that it would also be better to insert a series 10 ohm resistor in both center wires from the two jacks to prevent "loading down" (reducing the resistance of) the output circuits, which might cause excessive current drain and overheating of the amplifiers.

Q. I have a police scanner. When the dispatcher scrambles transmissions, I can't understand the communications. Do I have the law correct that the Communications Act of 1934 states that anyone has the right to receive any transmission from any source? (Gilpin Reuter, Osage Beach, MO)

A. The Communications Act of 1934 does not give anyone the right to eavesdrop on communications not intended for them to hear. This has been a sore point among radio hobbyists and misunderstood since its inception.

With great wisdom, those who penned the Communications Act nearly 70 years ago realized that it would be impossible to prevent anyone from overhearing a clear-speech or text radio transmission, so they tried to protect the communicator's expectation of privacy by imposing common sense limitations on what the uninvited listener could do with the information he overheard.

Listening in on two-way (non-wireline) communications may be *permitted* by law, but it's not a *right*. A "right" to listen implies some entitlement or claim to that transmission, just as we have the right to free speech or the right to practice religion as specified in the Bill of Rights. But listening in on someone else's communication, whether done with an ear pressed against a wall or with a scanner, treads on another true right – that of privacy.

For many decades, the Act worked well. Most communications users recognized that the long antennas on their radios meant that

they were "broadcasting," so to speak, and that others could listen in. But now consumers are less hardware sophisticated, and antennas are subtler. Manufacturers and salespersons rarely warn customers that they may be overheard.

Scanners are more widely dispersed with far greater frequency coverage and capture facility. Publications tell them where to listen. Privacy has been compromised, confidential information has been repeated, and legislators themselves have been victimized. Starting in 1986 this has resulted in a series of imposing laws, restricting scanner manufacturing, importation, marketing, and use.

Q. As worldwide population grows, is technology adding to the earth's natural magnetic field? What are our strongest magnetic-field producers? (Donald Michael Choleva, Euclid, OH)

A. The earth's geomagnetic field is rather static (the north and south poles don't alternate), while virtually all of mankind's electrical devices utilize alternating current, resulting in oscillating magnetic fields which are totally different from those of Earth.

Not only that, but with the exception of radio, virtually all artificial electromagnetic fields are confined to their own immediate environments rather than extending worldwide. We offer little competition to Earth's natural magnetic field.

Quite probably the strongest artificial magnetic fields are those produced by the giant cyclotron/synchrotron generators used to study subatomic particles. But rest assured that their fields are confined to their immediate operational focus.

Q. I read that there is a mobile GPS for private detectives that can display a map showing where and how long a marked car has been anywhere. Can you provide any details? And how does someone find an "infinity transmitter" hooked to a phone? (Wes Witten, e-mail)

A. This James Bond sort of tracking device may be available to federal agencies, but I've not seen it for the street detective. Keep in mind that for it to show itself on a GPS map screen, its signal must have to be picked up by something that can determine the target's latitude and longitude. That would have to be a satellite network or a terrestrial radio-direction-finding system capable of giving cross-coordinates.

In the real world of espionage, tracking is done by a "bumper beeper" transmitter on the target vehicle received by another vehicle following it perhaps several hundred or even several thousand feet behind. The following vehicle has a directional antenna array which can tell left from right so the agent knows when the vehicle has turned.

This information is usually displayed on a panel with a circle of LEDs representing a compass; the correct LED shines to show the direction the target is from the agent. The strength of the signal gives a rough approximation of the distance.

Infinity transmitters – radio bugs which answer a telephone so the caller can listen to nearby conversations even though the handset remains cradled – are patently unlawful when used without a court order.

These and other taps on a phone line can usually be detected by the use of a "time domain reflectometer (TDR)," an oscilloscope with a timed pulse output. As the pulse travels down the phone line, it will reflect back if it comes across a physical tap. This can be computed on the screen as a distance in feet, giving the countermeasures investigator a place to look. Some taps, however, are virtually undetectable without a physical examination of the entire phone line. This is always recommended.

Q. I recently received in the mail a printed solicitation from a Maryland source looking for production quantities of a hand-carried device that could block all frequencies (microwave, infrared, radar, laser, sound, etc.) so that no one could effect surveillance on the user. Is such a device possible or even legal?

A. No. A device that would blanket the individual with broadband noise – acoustic, electromagnetic, radio frequency, visible, infrared, etc. – is stretching credibility. And even if it were possible (or the user didn't mind that he couldn't carry it), it would be illegal because it would cause deliberate interference. It sounds more like paranoia than protection.

Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: www.grove-ent.com

Getting Geared Up for Summer

In this column we present simple ideas and tips to make your listening more enjoyable. I make every effort not to duplicate an "idea" that has appeared elsewhere on the Internet or in other publications. But, great minds undoubtedly think alike, and you may find one of these ideas is something you have been using for years. If you believe you have a hint, tip or unique solution to a problem, please send it on to me. I will give you full credit.

29 Last month I listed a web site for a forest fighting crew, the "Hot Shots." There is a related magazine, appropriately named *Wildland Firefighter*. You can request a free sample by calling 1-800-964-8971 or www.wildlandfirefighter.com. The subscription rate is a little pricey, but the color photos and articles are first class.

30 Computer and internet related tip on managing your frequency lists: When I create or copy information, such as a frequency list, I like to identify where I stored the document. In Word 97, I go to View, then Header and Footers. The footer box pops up and I hit the down arrow key to take me to the bottom (footer) of the page. I click on the page #, then hit the tab key, then Insert Filename and Path, then tab again for the Date Symbol. I make sure my page margins are correct and the footer will print on the bottom of the page.

When reviewing a printout of the list, I can always locate where I have stored the information on my hard drive. I use a special folder for Master Frequency lists, with appropriate sub folders for further organization.

31 Father's Day is coming in June. For those readers who qualify, why not ask for a monitoring related gift? It could be a new scanner, battery pack, mobile antenna – well, why not just ask for a gift certificate? Better than another flashy tie or an addition to the fishing lure collection.

32 This month's theme: Get geared up for the coming holiday weekends. Several major holidays are ahead; Memorial Day, the 4th of July and Labor Day. Some lucky people

make every weekend a holiday! All these occur during the sunny summer months, so we can count on lots of people being outside, engaging in outdoor sports. These activities tend to bring a higher than usual number of emergency calls because of drownings, boating accidents, lost hikers, vehicle accidents – you get the idea.

Whether you are at home or at the beach, you will hear nonstop action during these holidays. The best times to listen are usually between noon and midnight. Don't forget to program into your scanner the local park ranger frequencies, National Forests, and National Parks. Marine/Coast Guard frequencies will also be busy.

The 4th of July is especially busy beginning the day before, and even the day after. The night of the 4th is incredibly busy with fireworks related fire calls. This is a great time to go to the top of a parking structure or high hill for viewing the fireworks, as well as catching all the scanner traffic.

33 The weather produces many listening opportunities. Tornadoes, floods, heavy hail and lightning will always cause the public safety channels to light up. Look at such storms as a window of opportunity for serious monitoring. Your scanner can literally save lives, if you learn of impending danger and act accordingly. You might find yourself seeking shelter, or advising others to do the same.

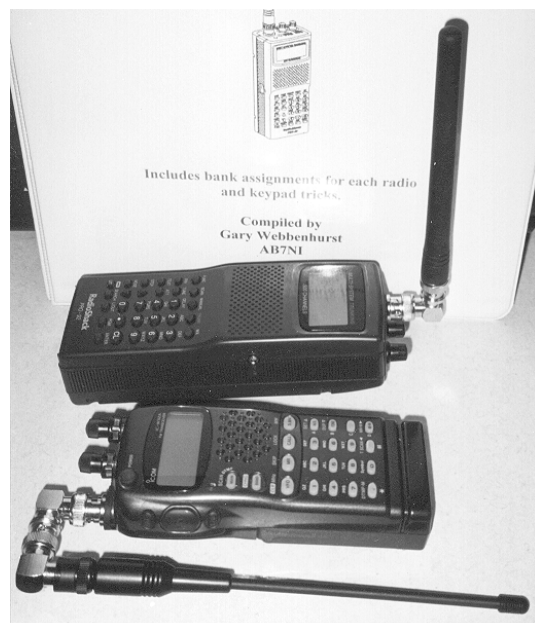
If you have one of the new radios, it might have a special weather alert mechanism. The Pro 2052 takes full advantage of the latest technology used by the NOAA. The National Weather Service has assigned a six digit number to every county (or parish) in every state. You can go to their website to see what number has been assigned for your county. Try www.nws.noaa.gov/nwr.

Special weather or emergency information is then transmitted using the local code numbers to reach specific counties. The PRO 2052 allows you to designate up to 15 different counties for alert status. Thus, you could be alerted for weather warnings over a large area, or small area, whatever you select. Being a storm chaser, I plan to use this as part of my strategy to know what is occurring, and where.

34 The summer weather means I will be spending more time in my car. I occasionally find myself waiting in a parking lot or other public place, watching a ball game, waiting to pick up passengers, storm spotting, etc. So I turn on the scanner. However, I don't want anyone to take notice of my activity, mistaking me for a police stakeout. Rig for silent running. I keep noise and movement to a minimum. When out and about, earphones are a must. Thanks to the popularity of Walkman radios, no one pays much attention to someone with an earphone.

Don't like the "beep" sound your scanner emits? There is often a keypad or internal modification to turn this annoying sound off.

35 Right angle BNC connectors. Use one for raising the antenna while the scanner is lying flat. Use two for a 180 degree angle to have the antenna hang down alongside of the radio. Thus it won't poke you in the side, or break off. Yes, I know, this is an old idea. But it is so good that it bears repeating for those who are new to the hobby.





Some Good Scanner News

Let's start off this month with some terrific news from the great state of Massachusetts. Massachusetts has always been a state where scanner buffs have been appreciated. Police and fire departments generally have no problem with their local citizenry monitoring their communications....or at least they have not been afraid of it.

Last year the Holyoke, Massachusetts, Police Department was ready to spend \$15,000 for radio equipment to support a new frequency for their channel 2. It turns out that Holyoke was operating on 158.970 for their records channel, but their license had long ago expired (if they ever held one at all).

158.970 is an interesting New England frequency. It had long been quite active as the regional Intercity Police channel, particularly in the eastern part of the region, but as more and more agencies switched to UHF its use had markedly declined.

What is really interesting about this story is what went on during the city council meeting on the subject of allocating funds for the new frequency. To quote the Sunday *Springfield Republican* newspaper, "The (police) chief also assured Ward 4 Councilor Richard M. Welch that civilian scanner jockeys will still be able to listen to the crackling of police work on radios at home."

We hereby nominate this chief, and the Ward 4 Councilor, for Men of the Year. No, let's make that President as long as it's the electoral season! It's about time we heard from public officials, particularly a police chief, who recognized and respected the importance of the general public staying attuned to not only crime in their city, but also the fine work that their civil servants perform. Three cheers!

Unfortunately this attitude situation stands in stark contrast with other, less open, areas of our country. In a future article we'll discuss the efforts of scanner buffs who are truly fighting City Hall in their own community, as well as for communities across the country, where public officials feel the need to shut out scanner listeners.

◆ Scanners in the Media

What rationale do some of these officials give for denying hobbyists, and the local population, the ability to listen? Sometimes it's just the desire to buy the latest and greatest digital technology. Other times they falsely claim that only criminals use scanners.

The following is a case, though, where two-way radios and criminal activity are connected. We've heard an increasing number of reports lately of communities that have been stricken with cases of unlicensed persons mucking around with the transmissions of local public safety agencies.

In the December 30th San Francisco *Chronicle* it was reported that a "radio pirate" was invading the "police airwaves" of the Berkeley, Albany, and

Richmond, California, police departments, as well as the airwaves of the California Highway Patrol. The offender was using taunts, profanity and threats over the air, as well as falsely reporting crime, but after nearly a month of these tirades the criminal had yet to be caught. Not only can this crime be life-threatening for police, fire or EMS personnel, it can also be the "straw that broke the camel's back" when it comes to a community contemplating a switch to digital and/or encrypted communications.

◆ Come Again?

Here's a case where the media incited some totally unwarranted anti-scanner sentiment. In the February 21st issue of one of the nation's most respected magazines, *BusinessWeek*, there was a cover story on cyber crime. The article was spawned out of the "denial of service" attacks that month on Yahoo, eBay and other prominent web sites.

What's so strange about that? Well, on the last page (page 42) of this major story is a large photo with the caption, "Careful, It's Hot - Secret Service Agent Weaver with recovered loot: Companies are often slow to report crimes and reluctant to reclaim goods."

In the photo you see a Secret Service agent standing behind a veritable wall of scanners including an AR-8000, Icom R-10, Uniden Sportcat SC-150, and more. Wrapped around some of these units are evidence tags.

Does this have anything to do with the story on denial of service attacks? None. A careful reading of the article yields no further clues. The agent in the story was describing a stolen CD-ROM on which a Japanese company's trade secrets were held. He had been investigating cyber crime. Scanners were never even hinted at in the article. The photo may just as well have been a montage of stolen fondue forks. Once again our hobby is painted with a broad brush as being somehow connected with criminal activity. Where is the justice in that?

◆ Radio Shack PRO-92 vs. Uniden BC-245 Revisited

Our recent comparison of the Bearcat 245 and the Radio Shack PRO-92, two of the most intriguing handheld scanners ever produced, generated a good deal of comment and discussion. While we have read in online newsgroups of hobbyists who are satisfied with their PRO-92, all of the mail that this editor received was "Pro-245" and anti-92, which tracks with the position of the original review.

What is important to note, though, is that a senior Radio Shack executive has informed us in no uncertain terms that the return rate on the PRO-92 is no higher than that of the average scanner, perhaps even slightly lower, despite the general dis-

course on the matter. While there are vocal groups online, they are not necessarily the majority. In any event, here are just a few of the e-mails this editor received on the issue:

From Mark A. West: "I very much enjoyed your article in the February 2000 issue of *MT* regarding the Pro-92 and how it stood up against the 245XLT. And while you (the editor) personally couldn't make an opinion about the '92, I owned one for a whole week and developed several opinions about it. All negative ones. So negative in fact that I took it back to the Radio Shack I where I purchased it and bought a Pro-2052 (basically a Uniden desk-top in the Tandy case).

"I am truck driver. I am also a scanner eavesdropping fool with a ham license to boot. I need equipment that is straightforward, easy to use, and reliable. I found the Pro-92 to be none of these things. I never really knew if I was actually trunking in the correct mode and, it was extremely difficult to use while rolling down the highway. And quite frankly, what does a general enthusiast need with PL and DCS modes anyway? And then the display. The display is too small for the amount of information it is intended to display. And trying to make sense of those letters that mean one or more things, depending on the mode, is enough to give one a headache.

"I've been involved in the hobby since I was eight. I am thirty-four now and have amassed an amazing array of equipment, all of which is on this truck. With only three exceptions and those being my IC PCR-1000, R-10, R100; all of my equipment is Uniden made. Three of these, the 245XLT, BCT7, and my Pro-2052 are active all the time. But nowhere will you find that 92.

"Maybe it was a good first attempt. And like you wrote, maybe this will light a fire underneath some of these receiver outfits out there and produce a fury of new and exciting trackers. I just know that the PRO-92 ain't going to be one of 'em."

Another reader, *Broadus Hester*, asks, "In reference to your article in the February 2000 edition of *Monitoring Times*, I enjoyed it and the comparison was well carried out and documented. Have you had any experiences with the PRO-94 and, if so, what are your thoughts on that model scanner?"

This editor has not had a chance to use the PRO-94, but as it is a Uniden design and uses the Motorola control channel and the AFS-mode for viewing EDACS talkgroups, we are partial to this radio. However, the 94 does not "multi-trunk" which limits its functionality to some degree, and it is not computer programmable. [See *Bob Parnass' review in this issue - ed.*] We also invite readers to submit their own perspective.

Finally, *Jeffrey J. Lipsen* of Issaquah, Washington, provides further comparison between the two radios at the opposite end of the country from where our original report was written in South Florida:

"Your article on the BC245 and Pro 92 comparison was excellent you had some great data. I find the Pro 92 a very poorly designed radio. I live in Seattle and the 245 is by far a better radio... In your expertise do you think we will see a digital scanner soon?"

We can only hope that a digital scanner is under development. The problem right now is that, while there are a growing number of digital systems in place, or under construction, across the United States, the number still does not come close to the number of trunking systems that were in place when the original Trunktracker (the Uniden BC-235) made its debut. In other words, the market for a digital scanner isn't quite significant enough - yet. We believe strongly that the installed base of digital systems will very shortly merit the introduction of a digital scanner. Still, it's quite a long engineering and development road to go.

One final note. While every reader who wrote us voiced support for the conclusions of the February article, particularly as it related to the PRO-92's questionable technique for tracking Motorola trunking systems, it must be restated that the radio has a lot going for it, especially the method in which it handles sub-audible tones. We know there are hobbyists who like the unit (for use at air shows to monitor military aircraft, for example) and we invite them to send us their perspective.

◆ Amusing Scanning

With the spring and summer months upon us, it's time for some updates on amusement park scanning. We've all seen innumerable Disneyworld and Disneyland listings, but here is a report from an anonymous contributor on Hershey Park scanning. We encourage everyone who has similar data for other parks to please send it in. Amusement park scanning is some of the most unique and fun listening around. Next time you go, take a handheld and an Opto Scout or Multicounter if you can. You might not be quite as comfortable sitting in that ride as the next guy, but you will be tuned into everything going on in the park.

Hershey Park (Pennsylvania)

464.150 Security F1
464.425 Security F2
464.275 Maintenance and Operations
464.375 First Aid F3
463.325 Shuttles
463.850 Shuttles
464.400 Paging
464.575 (not sure but heard traffic - maybe an auxiliary use or talk-around type channel)

"I heard once someone say to go to "Security channel 1" which led me to believe there may be two classes of radio users in the park (security and operations), hence two sets of handhelds with different channel schemes. Don't know for sure, though.

"Put 464.150 in your priority slot if you have one. It is the juiciest. Several cars were broken into during just 4 hours. Also definitely put in the FRS channels; they were extremely busy. The overflow help (for the Memorial Day crowd) were using the distinctive yellow Motorola FRS radios for communication (so many families have these nowadays, too). There is a CB-type Big-Stick antenna near the Monorail station but I did not hear anything around VHF-low local to the park. Nothing

on CB either (at least in the parking lot).

"Local fire for York and surrounding counties was on 33.90. Police repeaters were in the 155 MHz range but I didn't write them down at the time. But they were strong and will intermodulate with York City PD.

"I wore my PRO-62 on my belt clip with an ear-piece and received no adverse attention. In fact rug-rats using FRS radios were plentiful.

(This is a boon for scannists! We attract less attention now because everyone thinks we're just another family member with an FRS unit! A Sportcat 200 though will blend in better though, than larger radios like the Bearcat 3000 - Rich).

"In general *Police Call '99* seemed to be accurate for the area around Hershey. If you do not have one, stop in at a Radio Shack when you get there.... The only bad thing about the trip is I drove right past the Harley-Davidson factory and didn't have time to stop in. :(Have fun."

Thanks for the excellent report. You covered both park operations and security, analyzed some of the radio and antenna equipment, and provided information on the local police and fire departments. These are good tips for future contributions.

◆ Late Season Sking Anyone?

Fred Richter wrote us with an incredible report on Mammoth Mountain, California, trunking communications:

Mammoth Mountain Trunked System Frequencies Used:

855.8375, 856.5125 - 860.5125

(Fleet Map: b0 S11, b2 S11, b6 S4, b7 S4)


Talk Group	Channel	Department and Function
600-1	1A	Ski Patrol
600-2 1B		Ski Patrol Alternate*
600-3	1C	Ski Patrol Alternate
200-1	2A	Host & Lift Operations Supervisors-Admin/ Bike Park**
200-2	2B	Gondola Operations
200-3	2C	Ski Hosts
200-5	3A	Lift Maintenance
200-6	3B	Lift Maintenance Alternate
200-7	3C	Lift Maintenance Alternate
200-9	4A	Grooming
200-10	4B	Grooming Alternate
200-11	4C	Grooming Alternate

200-13	5A	Snow Plowing & Snowmaking/Lift Construction**
200-14	5B	Snow Plowing & Snowmaking Alternate
200-15	5C	Snow Plowing & Snowmaking Alternate
000-9	6A	Race Department
000-10	6B	Race and Terrain Parks Alternate
000-11	6C	Terrain Parks (Snowboard Play Areas)
001-1	7A	Main Lodge Ski School/Golf Course Operations**
001-2	7B	Main Lodge Ski School Alternate
001-3	7C	Main Lodge Ski School Alternate
001-9	8A	Canyon Lodge Ski School/Golf Course Maintenance**
001-10	8B	Canyon Lodge Ski School Alternate
001-11	8C	Canyon Lodge Ski School Alternate
000-1	9A	Woollywood Ski School/Sierra Mdws. Ranch Ops.**
000-2	9B	Woollywood Alternate
000-3	9C	Woollywood Alternate
201-1	10A	Security Main Lodge
201-2	10B	Security Alternate
201-3	10C	Security Alternate
201-5	11A	Building Maintenance/Telecommunications
201-6	11B	Building Maintenance/Telecom Alternate
201-7	11C	Building Maintenance/Telecom Alternate
201-9	12A	Inn Operations/Guest Services
200-10	12B	Inn Operations/Guest Services Alternate
200-11	12C	Inn Operations/Guest Services Alternate
700-1	13A	Tamarack Lodge & Ski Center Operations/Lodge**
700-2	13B	Mammoth Snowmobile Adventures
700-3	13C	Tamarack/Snowmobile Alternate
201-13	14A	Transportation (Red Line & Staff)/Postpile Shuttle**
201-14	14B	Transportation (Parking Control & Shuttle)/Alternate**
201-15	14C	Transportation (Green, Blue, Yellow, & Orange Lines)
851.3875R	15A	North Village Property Maintenance***

* Ski Patrol does not normally use B, as B and C are hard to distinguish with gloves on. Normal use A for primary and C for alternate.

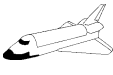
** Summer Channel Use

*** This is a conventional repeater, separate from the trunked system. It has no "B & C". This is probably used as a backup channel for all communications in case the trunked system goes down (since all handhelds contain it).




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Scanner Logs

Larry Van Horn
larry@grove-ent.com



Italian VHF-Low Band Skip Logs

By Ciccio Munaron

(OM=male, YL=female)

29.750 Swedish Pagers (voice also)
29.80-29.90 Possible Russian pagers (no voice)
30.00-31.50 Russian cordless phones, 25-kHz steps
30.2375 Possible French pagers (no voice)
30.2625 Possible French pagers (no voice)
30.450 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
30.600 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
30.900 Probable Russian pagers (no voice)
31.725 Non voice pagers, probably European country
31.750 Non voice pagers, probably European country
31.775 Non voice pagers, probably European country
32.150 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
32.161 Russian 100Baud, 140-Hz shift FSK system with scrambled voice in background
32.200 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
32.250 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
32.266 Russian 100Baud, 140-Hz shift FSK system with scrambled voice in background
32.300 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
32.350 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
32.359 Russian 100Baud, 140-Hz shift FSK system with scrambled voice in background
32.450 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
32.650 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
32.750 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
33.050 Chinese OM with "western" words also heard: "over" and "roger"
33.050 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
33.150 Chinese OM with "western" words also heard: "over" and "roger"
33.200 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
33.200 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
33.250 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
33.300 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
33.345 Unid pager, probable from South or Central America (no voice)
33.350 Probable Romanian Institute of Meteorology and Hydrology: YL/OM passing synoptic weather reports
33.350-33.475 Caribbean or Central American fruit transports (25 kHz steps)
33.450 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
33.584 Russian 100Baud, 140-Hz shift FSK system with scrambled voice in background
33.600 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
33.650 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
33.750 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
34.000-35.000 Turkish agency (possibly police) 12.5-kHz steps
34.223 Russian 100Baud, 140-Hz shift FSK system with scrambled voice in background
34.250 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted

34.350 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
34.440 Russian OM giving radar tracks in LSB, no ID given.
34.450 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
34.500 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
34.500-35.200 Brazilian Taxicabs YL in Portuguese giving addresses and calling 2-figure call signs (probably mobile cabs). Cab-style dispatching. Spacing is 20-kHz step with few exceptions.
34.600 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
34.720 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
34.750 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
34.900 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
34.950 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
35.000-36.200 French National Route Maintenance, 12.5 kHz steps. Input frequencies for repeaters are 39.400-40.600 MHz.
35.150 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
35.600 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
35.600 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
35.650 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
35.700 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
35.700 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
35.720 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
35.900 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
36.300 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
36.560 Russian OM giving radar tracks in LSB, no id given.
36.800 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
37.700 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
37.750 Israel, possibly military in Hebrew. Mainly OM some YL dispatchers noted
38.500-39.200 Brazilian Taxicabs YL in Portuguese giving addresses and calling 2-figure call signs (probably mobile cabs). Cab-style dispatching. Spacing is 20-kHz step with few exceptions.
38.560 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
38.600 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
38.820 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
39.100 Possible Iran with OM in Farsi on simplex channel, "Tehran" mentioned.
39.380 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
39.500 Spanish (Caribbean accented). Probably from Cuba, Puerto Rico or Dominican Republic
39.520 Spanish (Caribbean accented). Probably from Cuba, Puerto Rico or Dominican Republic
39.740 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
39.800 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
39.820 Unid agency in Germany or Austria. Noted selcals and short digital bursts. Very short single-tone tail (quite low-pitched).
39.825 Spanish male calling 3-figure stations (probably mobiles) from South America or Central America. Seems a police-style dispatching.

39.920 Spanish (Caribbean accented). Probably from Cuba, Puerto Rico or Dominican Republic. Talking about sand being loaded on a truck.
40.000-40.700 Portuguese Fire Departments, 20 kHz steps. Input frequencies for repeater could be from 33.300-34.000 MHz.
40.900 Spain pagers (voice also)
40.925 Spain pagers (voice also)
42.540 Probable Caribbean or Mexican net
43.100 English (American accent) and other unid accent (probable Middle Eastern or South American). Phone-patching, possible paging capabilities. Heard in late morning when propagation is opened to South America and Middle East at the same time. Oil rigs in Persian Gulf?

GTE Airfone Frequencies

Courtesy of Bill Crocker

All stations on AM (A3A).32 channels are assigned to each transmission site using 6-kHz channel spacing. Below are the lowest frequencies used for each site.

Abajo Peak, UT	945.204	Kalmath Falls, OR	945.884
Albuquerque, NM	945.804	Las Vegas, NV	945.404
Atlanta, GA	945.404	Los Angeles, CA	944.604
Austin, TX	945.204	Meridian, MS	945.604
Boston, MA	945.204	Miami, FL	944.404
Bridgeton, MO	944.604	Monhans, TX	945.004
Burlingame, CA	945.204	Nashville, TN	944.404
Charleston, SC	944.604	New Orleans, LA	945.004
Charleston, WV	944.204	Orlando, FL	945.004
Chicago, IL	945.804	Phoenix, AZ	944.804
Delta, UT	944.204	Pittsburgh, PA	944.804
Denver, CO	944.604	Seattle, WA	944.604
Des Moines, IA	944.204	Shreveport, LA	945.804
Fort Wayne, IN	945.204	Springfield, MO	945.404
Grand Island, NE	944.404	Tallahassee, FL	944.804
Hawthorne, NV	945.604	Washington, DC	944.604
Houston, TX	945.404	Wilmington, NC	945.204
Irving, TX	944.804	Woodward, OK	945.604
Jamaica, NY	945.204	Nationwide Channel	899.000

Channel spacing every 6-kHz (i.e. 944.204, 944.210 with the last channel 10 kHz above the previous one)

Request for Cruise Line Loggings

From time to time we get request for cruise line frequencies. Here is the information I have on hand at this time for the three cruise lines below. If you have anything to add to this list, please pass them on.

Carnival Cruise Lines (Miami, FL): 151.745
461.300/466.300 461.650/ 466.650
Princess Cruise Lines (Puerto Rico): 853.4875
Royal Caribbean Cruise Lines (Puerto Rico): 858.7875

Passengers on various cruise lines should also keep an eye on itinerant frequencies, maritime channels, and look for 800 MHz trunking systems while onboard.

GROVE

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More Weather Changes

The weather keeps changing on HF (high-frequency, the spectrum from 3 to 30 MHz). Transmissions of weather data keep going away and coming back faster than users can update their lists.

Continuing last month's topic, it definitely appears that the US Air Force has dropped its HF weather by radio facsimile (fax). These were the nice charts for North American aviation weather sent daily by several US military transmitters repeating the audio from KGWC, the Air Force Global Weather center – Note that KGWC, like all these “K” weather identifiers, is not a radio callsign but a source ID that happens to follow the international call letter convention. Actual transmitter callsigns vary.

Furthermore, most of these transmitters were actually independent sideband (ISB) stations. The lower of the two sidebands (the LSB) was typically used for frequency-shift keyed radio teletype (RTTY) from the Air Force's Digital Weather Switch. This was a separate “wire,” the Aviation Weather Network, identified as KAWN (again, not a radio callsign). Like the fax, KAWN had become a bit strange, repeating weather observations from the same few southern US locations, as if nobody else existed, or cared.

In March, all KGWC frequencies continue their steady idling on the 1500-Hertz “black” tone, whistling away forever. Worse, the KAWN RTTY in the lower sidebands has recently gone to its own idle tone of 1200 Hz, day and night. We may have seen the end of this nice old transmission as well.

◆ Midnight in Moscow?

Russia, with its vast size and isolated areas, has always been a good source of obscure weather transmissions. Typical is the Russian VOLMET network. VOLMET stands for “flying weather,” as loosely taken from the French, and it usually refers to an international service where ground stations take turns broadcasting airport weather observations and forecasts for major destinations. These are highly standardized, and usually in English.

However, Russia has always run a network intended more for domestic use. Broadcasts are in Russian, and some of them come from pretty exotic places. Unfortunately, these USB voice stations are beginning to drop off as well. Recently, the Moscow station vanished from its network, which uses frequencies of 2941, 6617, 8939, and 11297 kilohertz (kHz). This leaves a huge gap after St. Petersburg signs at 10 and 40 after the hour, and until Kiev and Rostov pick it up at 20/50 and 25/55 minutes. It also leaves a major hole in Russian VOLMET coverage.

It would also appear that another network on 3116, 5691, 8861, and 13267 kHz is down to Kirensk at 00/30 and Irkutsk at 25/55. A third, so far intact, includes Tbilisi, Aktubinsk, Almaty, and Tashkent at 00/30, 05/35, 10/40, and 20/50, on 3407, 6730, 8819, and 11279. A fourth includes

Syktvykar, Kol'tsovo, Novosibirsk, Samara, and Tumen', at 00/30, 05/35, 10/40, 15/45, and 20/50 minutes after the hour.

◆ Now the Good News

All these disappearances make it look as if weather information might vanish from HF, but this is unlikely. For example, South African Navy weather fax is starting up again. Once, it came from Pretoria, but this station closed. This year ZSJ, Silvermine Radio, near Cape Town, has a limited schedule on a low-power training basis. These faxes originally started only for the Cape to Rio Yacht Race in January, but now the schedule is supposed to expand. When it does, we'll pass it along.

Something similar is happening in Greece, and in the US the Coast Guard continues to improve its own weather fax schedule. Recently, the satellite pictures from KVM 70, a NOAA NWS station in Honolulu, were changed to eliminate redundancy. The two new ones begin at 0030, 0630, 1230, and 1830 daily. Each takes 15 minutes to send, on 9982.5 (night), 11090, 16135, and 23331.5 (day). Tune these carrier frequencies 1.9 kHz lower in USB mode. If reception is good, try 8-bit mode for a real nice picture.

◆ More French RTTY Strangeness

French diplomatic and military communication has always given RTTY fans plenty of puzzles, with its many circuits, transmission modes, and NATO (North Atlantic Treaty Organization) routing indicators. As if this

isn't enough, a year-old letter-substitution code is coming into frequent use. This code never changes, making it rather worthless. Listening has shown it to be a simple substitution of CF for A, CG for B, CH for C, and so on through the alphabet.

The strangest thing is when they encode one letter of a plain, ordinary, standardized, radio procedural signal. For example, we'll see the DE between two callsigns change to CIE. The calls, usually those RF- routing indicators, remain completely in the clear, but the DE, an internationally-recognized shorthand for “from” or “this is,” gets encoded. Huh?!

Something similar happens to good old BT, the “short break” signal, which delimits message parts or fills in while the operator thinks of something more to say. It's a simple signal, it's been around longer than anyone can remember, and nobody thinks much about it. Not, that is, until for whatever reason it's encoded via this substitution system, becoming CGT.

Since these aren't really fooling anybody, only one major question remains. What's the point of taking these brevity signs, which only exist to shorten communication, and making them longer? Well, this is probably not ours to know.

I guess weirder things happen in HF utility. “CU” next month!





Abbreviations used in this column

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
ARQ-E3	Single-channel ARQ teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CG	Coast Guard
COQ-8	Algerian 8-tone teleprinting system
CW	Morse code telegraphy ("Continuous Wave")
FACSFAC	Fleet Area Control and Surveillance Facility
FAX	Radio Facsimile
FEC	Forward Error Correction teleprinting system
FEMA	Federal Emergency Management Agency
JPL	Jet Propulsion Lab
JSTARS	Joint Surveillance Target Attack Radar System
LCU	Landing Craft, Utility
LSB	Lower Sideband
MARS	Military Affiliate Radio System
MFA	Ministry of Foreign Affairs
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NGB	National Guard Bureau
Ops	Operations
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission
SHARES	Shared Resources
STS	Space Transportation System ("Space Shuttle")
UK	United Kingdom
Unid	Unidentified
US	United States
VIP	Very Important Person
VOLMET	Aviation weather observations
Y2K	Year 2000 computer changeover

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

- 855.0 Unid-North Korean "numbers" station (V15?), with "Red Flag Song" for 3 minutes, then coded message, at 1500. (Takashi Yamaguchi-Japan)
- 2044.0 HLY-Yosu Radio, South Korea, with short melody mirror of Beethoven's 9th Symphony "Ode to Joy" between phone patches at 1317. (Yamaguchi-Japan)
- 2360.0 Unknown ALE burst, National Guard, at 0753. Similar ALE transmissions heard on 4603, 5402, 6049, 7428, 12129, 12219, 13935, 14899, 22983, 23390, and 24008, around the Y2K rollover. (Paul Bunyan-MO)
- 2507.0 HLN-Kunsan Radio, South Korea, with short melody mirror of Beethoven's 9th Symphony "Ode to Joy" between patches at 1205. (Yamaguchi-Japan)
- 2670.0 Coast Guard Group Woods Hole, US Coast Guard, MA, with scheduled bulletins at 2240. (Ron Perron-MD)
- 3345.0 WUJ 1-US Army Corps of Engineers, NE, calling WUJ 16 on "channel 1," at 0458. (Bunyan-MO)
- 3395.0 KHA 915-NASA, working KHA 920 (JPL, CA) and KHA 921, in Y2K net, at 0420. (Bunyan-MO)
- 3485.0 New York Radio, VOLMET at 0811. (Sue Wilden-IN)
- 3496.0 6PXJ-Unknown station, repeating CW loop "V ABYZ DE 6PXJ," at 1410. (Yamaguchi-Japan)
- 4014.0 ZSJ-South African Navy, Silvermine, with weather chart FAX, 120/576, at 0509. (Bob Hall-RSA)
- 4369.0 WLO-Mobile Radio, AL, on maritime channel 405, with an offshore weather forecast at 0005, then the traffic list at 0022. (Wilden-IN)
- 4372.0 Giant Killer-US Navy FACSFAC, VA, coordinating link-11 tracking data with "2-D-H," others, at 0323. (Perron-MD)

- 4562.0 Bull Dog Major-Possible AL Army National Guard, working Water Bucket at 0333. (Bunyan-MO)
- 4610.0 AFA3LE-US Air Force MARS, working SN10, at 0704. (Bunyan-MO)
- 4625.0 The Buzzer-Channel marker for Russian-language "numbers" station (S28), at 1450. (Yamaguchi-Japan)
- 4924.5 NGB 1-US Army National Guard, working NGB 15, after ALE bursts, at 0841. (Bunyan-MO) (NGB01 - NG HQ in Arlington, VA - LVH)
- 5154.0 "K"-Single-letter CWHF channel marker, probably Petropavlovsk-Kamchatskiy, Russia, at 1440. (Yamaguchi-Japan)
- 5180.0 Cape Radio- US Air Force, Cape Canaveral, FL, working King One, US Air Force, for STS-103 space shuttle mission, at 0141. (Bunyan-MO)
- 5190.0 DoD Cape-US Department of Defense, Cape Canaveral, FL, working NASA Booster Recovery Vessel *Liberty Star*, for STS-103, at 0001. (Bunyan-MO)
- 5277.0 Panther-US Drug Enforcement Agency, Nassau, Bahamas, working US Coast Guard 63A and 33C, at 0142. Panther, working CG 19C, at 0157. CG 34C, working Panther at 0217. (Perron-MD)
- 5431.3 L9CC-Unknown station, repeating CW loop "V CP17 DE L9CC," at 2200. (Yamaguchi-Japan)
- 5437.5 WUE 6- US Army Corps of Engineers, TN, working WUB 5, Norfolk, VA, at 0425. (Bunyan-MO)
- 5696.0 Coast Guard 6016-US Coast Guard, Guantanamo Bay, Cuba, working CAMSLANT Chesapeake at 0255. (Perron-MD) CAMSLANT, working numerous helicopters and cutters aiding distressed freighter near Kingston, Jamaica, also using 10991.6, at 0415. (Bob Puharic-PA)
- 5800.0 Overtone-US military, working Antiquity (suspected as control station WAR 46, MD), and Neon Gas, also using 6697, 8992, and 11244, at 0707. (Jeff Haverlah-TX)
- 6106.0 WGY 934-FEMA, Columbia, SC Emergency Operations Center, working WGY 994, Frankfort, KY, on F-17, at 1338. (Bunyan-MO)
- 6151.0 WGY 908-FEMA, Denver, CO, working WGY 938, Cheyenne, WY, on F-19, at 1645. (Bunyan-MO)
- 6408.0 Unid-Probably ZSO/ZSD, South African Navy, Durban, but in a previously unheard multi-tone teleprinting mode, also on 8630, at 1516. (Hall-RSA)
- 6694.0 Tusker 40-Canadian Forces CC-130, Greenwood, working Halifax Military, NS, at 1334. (Perron-MD)
- 6751.0 Cape Radio-US Air Force, FL, working King One, King Two, and US Coast Guard Cutter *Drummond*, for STS-103, at 0012. (Bunyan-MO)
- 6784.0 Unidentified CW cut "numbers" (M8), probably Cuban, uses weird substitution ANDUWRIGMT for 1-0, with messages 50833, 85171, and 99861, Wednesday at 1300. (Camillo Castillo-Panama)
- 6796.0 Unidentified CW cut "numbers" (M8), with messages 50831, 91132, and 76652, Monday at 1300. Same station, CW messages 08121, 33553, and 50643, Wednesday at 1200. Same station, CW messages 05842, 85173, 99863, Friday at 1300. (Castillo-Panama)
- 6825.0 Unidentified CW cut "numbers" (M8), with messages 32773, 26321, and 87682, Saturday at 1300. (Castillo-Panama)
- 6855.0 Unidentified CW cut "numbers" (M8), with messages 49483, 64112, and 19872, Thursday at 1300. (Castillo-Panama)
- 6866.0 Unidentified CW cut "numbers" (M8), with messages 56743, 14711, and 93652, Saturday at 1300. (Castillo-Panama)
- 6931.0 Unidentified CW cut "numbers" (M8), with messages 32771, 88942, and 83043, Wednesday at 1300. (Castillo-Panama)
- 7475.0 KLB 48-Federal Aviation Agency, Indianapolis, IN, working unknown station at 1600. (Bunyan-MO)
- 7605.0 Abnormal Israeli Mossad "numbers" (E10) callup "MIWT1C1," repeated phonetically for over an hour, parallel on 8127, starting at 1315. (Yamaguchi-Japan)
- 7935.0 WGY 955-IL Emergency Operations Center, Springfield, working IL State Police District 2, Elgin, IL, at 1643. (Bunyan-MO)
- 8047.0 NGB 39-US Army National Guard (Carson City, NV) on Y2K watch, wishing NGB 21, Tamuning, Guam, a happy new year, at 1400. (Bunyan-MO)

- 8056.0 KY 623-Unknown Y2K emergency station calling Kentucky State Emergency Operations Center, at 0046. (Bunyan-MO)
- 8127.0 VLB2-Mossad, Israel, phonetic "numbers" callup (E10a), no message, at 1330. (Yamaguchi-Japan)
- 8465.0 MIW1-Abnormal Mossad "numbers" (E10) callup, repeated phonetically for 10 minutes at 1410. (Yamaguchi-Japan) *Usually if there's no message the callup ends in "2" -Hugh*
- 8971.0 Striker 804-Royal Australian Air Force P-3C, working Western Sky (US Navy anti-submarine warfare, Pacific), at 0230. Polecat 09, aircraft passing coded "Diehard" position to Blue Star (US Navy, PR), at 0233. Hunter 01-UK Royal Air Force Nimrod, tracking a suspicious vessel with a Venezuelan flag, working Blue Star, Scorpion 08, and Shark 21, at 0327. Tomahawk-US military aircraft, exchanging coded "Whiskey" positions with Hunter 01, at 2230. (Perron-MD)
- 8980.0 Coast Guard 2140-US Coast Guard HU-25, in patch to Miami Ops regarding search and rescue, at 2220. (Perron-MD)
- 8992.0 Unknown station with a siren-like warble tone, followed immediately by this or a different station with the AM "Atencion" 5-figure female Spanish "numbers" (V2), at 0400. "M-4-T"-US military in "Exercise Esteem Highly Alpha," at 0442. (Haverlah-TX) FAP Lisboa-Portuguese Air Force, Lisbon, working unid aircraft at 2014. (Perron-MD)
- 9016.0 Rebellion-US military, working Medallion at 1853. (Haverlah-TX)
- 9017.0 SAM 202-US Air Force VIP flight, with patch via Andrews at 0118. (Haverlah-TX)
- 9120.0 Navy 49676-US Navy, working Andrews AFB, went to lower sideband to avoid a nearby link-11 data transmission, at 0331. (Haverlah-TX)
- 10125.0 CIO1-Abnormal Mossad "numbers" (E10) callup, repeated phonetically for 10 minutes at 1410. (Yamaguchi-Japan) *Not the first time, and this amateur band is still shared with a few fixed stations, but again the callup is "wrong." -Hugh*
- 10204.0 Net Loss-US military, in a net with Fan Blade, Replenish, and Ply Board, also using 11244, at 1948. (Haverlah-TX)
- 10536.5 CFH-Canadian Forces, Halifax, with RTTY weather, odd 590 Hz shift, at 0550. (Hall-RSA)
- 10780.0 Cape Radio-US Air Force, Cape Canaveral, FL, working NASA Booster Recovery Vessel *Freedom Star*, STS-103, at 1342. (Bunyan-MO) Cape Radio working Razor 61, a JSTARS surveillance aircraft, at 1845. (Perron-MD) King 11-US Air Force C-130, making a patch to US Coast Guard via Cape Radio, calling off a search accidentally triggered by a sighting of their training flares, at 1901. (Allan Stern-FL)
- 10796.0 NGB 24-US Army National Guard, working NGB 25, IN, at 1730. (Bunyan-MO)
- 10822.0 4XML-Unknown station, repeating CW loop "VVV BFR7 DE 4XML," at 2215. (Yamaguchi-Japan)
- 11059.0 Navy 49676-US Navy, working Andrews AFB, same stations as on 9120, at 0324. (Haverlah-TX)
- 11175.0 "Navy India-1-Kilo"-US Navy aircraft, in European exercise, looking for Tango-6-Echo, at 0209. (Stern-FL) Air Force Rescue 971-US Air Force, in patch to Coyote Ops regarding AF Rescue 858 and a distressed vessel, at 0243. AADS-US Army Vessel *Runnymede*, LCU-2001, working Hickam Global, HI, at 0236. Bone 12-US Air Force B-1B, working McClellan Global, CA, at 1548. (Perron-MD) "O-N-O"-Apparently Navy vessel USS *Montpelier*, working Hickam Global, at 0436. Kato 57-US Air Force, with patch to Altus Command Post regarding missed refueling due to boom problem on tanker Gassr 36, at 1927. (Haverlah-TX)
- 11176.0 Aircraft 559-Probable US military, calling Mainsail (any ground station. this station has a request) at 1708. *Wrong frequency for years! -Hugh*
- 11178.0 Charlie 3-Dutch Navy vessel, Curacao, calling Falcon 01, no joy, at 1815. (Perron-MD)
- 11195.0 SAM 300-US Air Force VIP flight, with a patch to what sounded like Andrews VIP, at 0110. (Haverlah-TX)
- 11232.0 CG 1504-US Coast Guard HC-130, with patch via Trenton Military to Coast Guard District 5, VA, asking status of grounded vessel, at 1504. (Perron-MD)
- 11244.0 Corn Beef-US military, with nightly test count at 0002. (Haverlah-TX)
- 11246.0 Turbo 41-US Air Force, calling MacDill at 1957. (Haverlah-TX) *MacDill Global closed a few years ago. -Hugh*
- 11455.0 Artistic Style-US military, calling Auto Key at 1955. (Bunyan-MO)
- 13089.0 NMN-US Coast Guard CAMSLANT, with high seas weather forecast at 2206. (Wilden-IN)
- 13264.0 Shannon VOLMET, Ireland, aviation weather at 1606. (Perron-MD)
- 13330.0 New York Radio-Oceanic air traffic, NY, working TWA 843, then a patch in Arabic from Saudia 003, at 1607. New York Radio, with a patch to Ryan Dispatch for Ryan 1242, at 1810. (Perron-MD)
- 13354.0 New York-NY Radio, North Atlantic air route net NAT-E, taking position of Speedbird 4521 (British Airways), at 1810. (Perron-MD)
- 13356.0 Air Jamaica 0505, made a patch to ground ops reporting engine flames and power fluctuation, continued on course after climbing settled the engine down, at 1607. (Perron-MD)
- 13722.0 NGB 35-US Army National Guard, Jackson, MS, calling NGB 28, Frankfort, KY, also some ALE bursts heard, at 1423. (Bunyan-MO)
- 13777.0 Tiger 31-US Air Force B-1B working the other B-1B in a flight of two, at 2237. (Bunyan-MO)
- 15642.0 Several SHARES net participants, including KGD 34 (US National Coordinating Center, Arlington, VA); DLA 303 (Bremerton, WA) and 303A (Defense Logistics Agency); Navy/Marine Corps MARS NNN0VUV (SHARES Coordinating Station, West, in Costa Mesa, CA) and NNN0ELA; Army MARS AAR1BD [AAR1DD, *SCS East? -Hugh*] and AAR8PA (Montana), apparently an alternate to the usual 14396.5 kHz, at 1800. (Bunyan-MO)
- 17414.0 RFFTCG-French Air Force, Istres, FEC message with the new CIE, CFU, and CIW codes, first time this frequency, at 1525. (Hall-RSA)
- 17499.0 Cherry Ripe-British Military Intelligence-6, Guam (E3a), started late at 1112 in progress, while parallel 23461 started on time at 1100. Asleep at the switch? (Yamaguchi-Japan)
- 18012.0 Circus Vert-French Air Force, Villacoublay, working aircraft with very weak signal, at 1656. (Perron-MD)
- 18018.0 Architect-Royal Air Force, UK, with airfield weather at 2044. (Perron-MD)
- 18183.4 Unid-Algerian MFA, Algiers, with French language traffic in Coq-8, to "Ambalg Kinshasa" regarding UN peacekeeping mission, at 1750. (Hall-RSA)
- 20095.0 Tango Charlie-Unknown station, working Bravo November in a simulated missile launch, possibly a US military exercise, at 2221. (Jay Steimel-AR)
- 23190.0 P6Z-French MFA, Paris, calling L9C, Argentina in FEC, at 1645. (Hall-RSA)
- 23337.0 Expo 91-US Air Force, followed ALE callup as "580020" [number indicates a tanker, as does callsign -Hugh; KC-135 tanker from Fairchild AFB, WA-LVH] with patch via Hickam AFB, HI, at 1944. (Haverlah-TX)
- 24370.0 P6Z-French MFA, Paris, testing in FEC at 1445. (Hall-RSA)
- 25241.7 RFVI-French Navy, Le Port, with ARQ-E3 message to Paris at 0833. (Hall-RSA)
- 25950.0 KPM 556-FM program feed, repeating commercial AM stations KFX, Vancouver, WA, and KSLM, Salem, OR, both with Aloha Bowl game, at 2320. (Bunyan-MO)
- 26441.7 RFFLCRSR- NATO routing indicator for French Navy FS *Cassard*, passing ARQ-E3 5-letter code groups to RFVIFLR (FS *Floreal*), RFFKCRC (FS *Circe*), RFFINDI (FS *Alindien*), RFFXOC (Armees Paris), and RFFLATO (FN Toulon), at 1121. (Hall-RSA)
- 26859.0 Jim Dandy-US military, working Latch Pin in clear and secure voice, at 2049. (Haverlah-TX)
- 27870.0 US Air Force ALE soundings from 538887 (KC-135 aircraft), GUA (Anderson AB, Guam), ADW (Andrew AFB, MO), OFF (Offutt AFB, NE), 401, GRA, GTL (Thule AB, Greenland), and JNR (Salinas, PR), starting at 2259. (Hugh Stegman-CA)

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Differential GPS

This month's column is a slight change of focus, both in terms of the frequency ranges involved, and the techniques required to decode and identify these common navigation signals. However, differential global positioning satellite (DGPS) signals provide a good example of how basic signal decomposition tools such as those provided by the higher-end decoders like the Hoka Code30 can, with a little ingenuity and work with a pencil and paper, take the place of a dedicated decoding module. If you haven't access to such tools, however, these signals still make for fun and interesting listening in a region of the spectrum most utility listeners tend to pass by.

Most are now familiar with the inexpensive GPS receivers now available almost everywhere. Developed and run by the US Government for military purposes, GPS uses a constellation of 24 satellites transmitting a highly accurate stream of timing information. By a complex process of triangulation and comparing the difference in arrival times of the information from four or more satellites, a GPS receiver is able to determine the receiver's position virtually anywhere on Earth to an accuracy of a few hundred feet. This is the standard accuracy available to users of the "public" or civilian data stream, although military and other users have access to much more accurate (and therefore encrypted) time information.

Differential GPS, however, allows position accuracies of a few tens of feet to be achieved. DGPS stations are placed at strategically important sites whose position has been very accurately surveyed. The position produced by the GPS receiver at these sites is then compared with the known survey position and a stream of "correction" data is transmitted over radio using a standard format or protocol. This correction data can then be integrated with the GPS data received at another site to produce a much more accurate position fix.

A large majority of the world's maritime navigation beacons are now equipped with a DGPS transmitter. Some encrypt their data for paid subscribers, but the majority are "open" systems. In the US and Canada you can find DGPS stations from 280 to 325 kHz, where a total of about 60 stations are now operating from coastal locations and strategic points on inland waterways.

The signals are narrow, about 200 Hz wide, are sent using either 100 bd or 200 bd Minimum Shift Keying (MSK) a special variant of PSK, and have a typical daytime range of between 100 and 200 miles. At night, however, we have found it possible to receive stations at a distance of over 1,000 miles. Table 1 gives frequencies for a number of North American DGPS stations.

◆ Decoding DGPS

The majority of stations transmit their DGPS data in a well-defined format known as RTCM or SC104. What's sent is a continuous stream of message blocks delimited by known preamble and error-checking sequences. The basic suite of message types sent are: Reference Station Parameters

(which identify the sending station); Radio Beacon Almanac (which gives status information); Differential Corrections (the all-important positioning data); and Special Message.

The continuous data stream, of course, contains mostly differential correction messages, with the reference station parameters sent at least a few times over a five minute period. It's the latter we're interested in extracting to identify a particular beacon.

As we mentioned before, unless your decoder has a DGPS module, performing this extraction requires either dedicated hardware or a decoder capable of demodulating the MSK signal and producing a raw data stream of 1s and 0s. After tuning in the signal correctly, with the Hoka Code 30, one can select the "Bitstream Analysis" module, set the demodulator to 2DPSK (MSK) (the "K" key followed by "6"), and then set the speed (either 100 or 200 bd as measured) using the "B" key to achieve the desired effect.

Hoka Code-3, Code3-Gold and other decoder users will at least be able to measure the speed and shift of the signal, which with the aid of Table 1 (see also the resources in Table 2) goes a long way to identifying a given beacon signal.

For positive identification, the next steps are a simplification of the method developed by WUN (World Utility Net) contributor Day Watson. First, save a few minutes of the raw data to disk (about 5 minutes will usually suffice). Then scan the data for valid preamble sequences (01100110). If any of these preamble sequences is followed by 001001, the next ten bits represent the binary value of the Reference Station Identifier (see Table 1's "RefID1 or RefID2" column – either may be sent by the given station).

It's then a simple matter of converting this 10-bit binary value to decimal by hand, or with a scientific calculator. (The standard Microsoft Windows "Calculator" accessory program in scientific mode will do this nicely!) Finally, check the Reference Station ID against the published lists.

◆ Utility Monitoring Central Updates

Want to find a particular type of digital signal? New this month on UMC (see Table 2) are extracts from our logbooks with complete details for over twenty different digital systems – common and not so common. Follow the "modes" link from the "Database" section.

◆ What is It?

We occasionally feature a puzzler for our readers; this month's mysterious signal appears in a number of places on the HF dial. The signal can best be described as having the same sound as a machine gun. The 2 to 10 second bursts extend across a bandwidth of about 10 kHz and the audio spectrum shows distinct peaks every 410 Hz. The signal randomly jumps in discrete 10 kHz steps across a few hundred kHz at a time. Currently, the signal can be heard in the eastern US in the following ranges at the following times:

1000-1600 UTC 16100 to 16400 kHz
1600-2200 UTC 14300 to 14600 kHz
2200-0000 UTC 10200 to 10500 kHz

Table 1: Selected DGPS Stations in N. America

kHz	Location	Station #	RefID1	RefID2	Speed
286	Wiaraton, ONT	918	310	311	200
286	Key West, FL	811	22	23	100
286	Sandy Hook, NJ	804	8	9	200
286	Upolu Point, HI	879	258	259	100
287	Fort Stevens, OR	886	272	273	100
287	Pigeon Point, CA	883	266	267	100
288	Gustavus, AK	892	284	285	100
288	Portsmouth Harbor, NH	801	23		100
289	Cape Canaveral, FL	809	18	19	100
290	Cape Ray, Nfld	942	340	341	200
290	Louisville, KY	869	168	169	200
290	Penobscot, ME	799	44	45	200
292	Cape Hinchinbrook, AK	894	288	289	100
292	Cape Mendocino, CA	885	270	271	100
292	Cheboygan, MI	836	112	113	200
293	English Turn, LA	814	28	29	200
295	Isabela, PR	817	34	35	100
296	St Jean, QUE	929	312	313	200
296	Galveston, TX	815	30	31	100
296	Wisconsin Point, WI	830	100	101	100
298	Cape Henlopen, DE	805	10	11	200
298	Charleston, SC	808	16	17	100
298	Omaha, NE	868	166	167	200
299	Rigolet, Nfld	946	344	345	200
300	Riviere du Loup, QUE	926	318	319	200
300	Appleton, WA	871	172	173	100
300	Mobile Point, AL	813	26	27	100
301	Macon, GA	822	48	49	200
305	Alexandria, VA	820	40	41	100
305	Kansas City, MO	867	164	165	200
309	Clark, SD	850	146	147	100
310	Memphis, TN	861	152	153	200
312	Egmont Key, FL	812	24	25	200
316	Brunswick, ME	800	42	43	100
322	Miami, FL	810	20	21	100
322	Youngstown, NY	839	118	119	100
323	Annette Island, AK	889	278	279	100
323	Robinson Point, WA	887	274	275	200
325	Chatham, MA	802	4	5	200
325	Hackleberg, AL	825	50	51	200

Table 2: Resources

US Coast Guard DGPS Pages:
www.navcen.uscg.mil/ADO/DgpsLatestStatusComplete.asp
Canadian Coast Guard DGPS Pages:
www.ccg-gcc.gc.ca/tosd-dsto/awti/DGPS/main.htm
Worldwide DGPS Database:
www.trimble.com
WUN Newsletter:
www.wunclub.com
Utility Monitoring Central:
www.mindspring.com/~mike.chace/umc.html



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FEBC Dropping English, End of an Era

As a result of consultations with FEB International in Cyprus, it was decided to close down the Overseas English Service broadcast in FEBC Philippines. Several factors led to this decision:

A new worldwide English service is being developed using both radio and the internet. This is a joint undertaking of both FEBC and FEBA. The idea is to have only one identity.

The issue of ownership: Unlike all of our language broadcasts, Overseas English has no real owner responsible for its overall direction and strategy. There is no English Director in the same way as there is a Chinese programming director or a Burmese director.

It is a strategic and structural decision, and not a decision based on the performance of the program nor on money. Overseas English programming is paying for itself through TDPs.

The new English service may be seen as a network of interfacing units (both production and transmission) based not necessarily or only in the Philippines.

The manner of closure, which will take place sometime in June or July, is being planned by Hazel Alvarez and the Overseas English team (Peter McIntyre, FEBC Manila, pm@febc.org.ph via Bob Padula, *Electronic DX Press*)

DXing the Internet

How about a world tour without a SW radio? Bill Flynn finds this site fascinating; enough to keep him busy for quite a spell. Give it a try: <http://www.guernsey.net/~sgibbs/www.html> Our quick look indicates the same mentality as SW DX country and transmitter-site hunting! Now all we need are awards for "Accessed all countries"!]]

R. Habana Cuba on 1700 kHz?

Here is how 49-meter band SW stations appear on some MW receivers above 1600 kHz, explained by Deane D. McIntyre, Calgary in the NRC-AM newsgroup. Example: Havana on 6000 kHz heard on 1700. Assuming IF of 450 kHz, when tuned to 1700, local oscillator is at 2150. $3 \times 2150 = 6450$, beating 450 kHz away from 6000.

AUSTRALIA For the legally minded, a detailed discussion of the Broadcasting Services Amendment Bill No. 4 covering international broadcasters from Australia is available from the Parliamentary Library's Bills Digest service at <http://www.aph.gov.au/library/pubs/bd/1999-2000/2000BD121.htm> (Matt Francis, *Electronic DX Press*)

AUSTRIA ROI Wien is radiating on 7575.0 a strong mixing product of the German program, observed from 0830 to 1230. That is, $13730 \text{ minus } 6155 = 7575$ (Hans-Joachim Koch, Niddatal, Germany, *DX Listening Digest*)

BELGIUM RVI A-00 schedule in English from March 26:

0400 NAm 15565-Bonaire
0700 Eu 5985 non-dir
1130 Eu 9925, As/Au 9865-Petropavlovsk-Kamchatskiy
1730 Eu 5910 non-dir; E/SEEu 9925 13710; E/CAf 17735; ME 17710-Jülich
1930 Eu 5960-Jülich non-dir
2230 NAm 15565-Bonaire

The 0700 through 1930 broadcasts are also on 1512 MW. 0400 programming is repeat of previous day. New program day starts at 1130, so 0700 is also repeat of previous day, except for news, and except on Sat and Sun when 0700 is first broadcast (Frans Vossen, RVI *Radio World*) Clear?

BOLIVIA A letter from R. Emisora Malku says in part: It is in the city of Uyuni, Provincia Antonio Quijarro, Departamento de Potosí and belongs to Federación Regional Única de Trabajadores Campesinos del Altiplano Sud (FRUTCAS). Writer is 21-year-old Erwin Freddy Mamani Machaca, in charge of programming, who has worked there for two years and ten months. Says he enjoys receiving reception reports. Station serves five provinces whose initials spell out A.N.D.E.S., but had to change name from R. Andes because of another R. Los Andes in Tarja. Malku means condor and/or President of the Originatory Authorities. Schedule [converted to UT]: 1000-1200, 2100-2400; including 1000-1030 *Música Nacional*; 2300-2330 *Informativo*. Frequency is 4795 (actually reported on 4796.6).

Uyuni is intensely cold the entire year, a rail center, and now one of great touristic promotion, due to its majestic Gran Salar de Uyuni (10,200 square km of salt desert, including a hotel and its furniture entirely made of salt; as well as several lakes.) Address: Casilla No. 16, Uyuni, Potosí, Bolivia; phone 0693-2145 (via Rogildo Fontenelle Aragão, Cochabamba, Bolivia, DX Clube do Brasil, *radioescutas*)

I have been hearing a station on 3190 around 0900 UT, in Quechua and playing

Andean music; reception not very good and difficult to ID. But thanks to the valuable collaboration of Rogildo Aragão in Cochabamba, the station is La Voz del Campesino, Sipe Sipe, depto de Cochabamba, a station not listed in Passport 2000 (Samuel Cassio, Brazil, *radio-escutas*)

With the collaboration of colleague Samuel Cassio in Brazil, I have discovered a station which I had thought would be a harmonic, since it is near my house and there are several harmonics from other MW stations. It is R. La Voz del Campesino on 3189.0 kHz. I have heard it only in the mornings at 1030, with *Encuentro con la Felicidad*, at 1050 news *Encuentro Nacional*. ID by woman: "En su cordial sintonía, Radio la Voz del Campesino, Voz y Pensamiento de los trabajadores del Agro, en el departamento de Cochabamba, Bolivia". (Rogildo Fontenelle Aragão, Cochabamba, Bolivia, DX Clube do Brasil)

BRAZIL R. Senado, 6190, will shortly begin producing programs in Spanish and English, according to Senator Geraldo Mello from RN, made public Jan 29 on the station's third anniversary at a special session of the Federal Senate (*Jornal do Senado* via Célio Romais, *radio-escutas*) So *de facto* replacement for RNB external service? But likely to be even more dull (gh)

CANADA RCI planned to move back into the Maison de Radio-Canada during April, from the Montréal building down the street they had been occupying for some 20 years (Bill Westenhaver, CKUT *International Radio Report*)

CONGO DR R. Liberté, first heard in March, supports the rebel Congolese Liberation Movement led by Jean-Pierre Bemba. Reportedly from Gbadolite in the NE of DR Congo on the border with Central African Republic, it's heard daily 1806-2305 on 15725 in French, also Lingala, and at 1820-1900 in English (BBC Monitoring) I heard Radio Liberté on 15725 USB three consecutive days *1805-2305*. Poor due to weak signal, even on professional equipment (Dave Kernick, UK, *hard-core-dx*) Radio Tele Liberté, tentative, 15725v, 2100-2130, Afropop songs and talk in French. Signal fairly good but intelligibility very poor due to low modulation. Only music was easy to copy but 2130 modulation become almost nonexistent. Rechecked at 2300, fair signal but very low audio to 2304* (Antonello Napolitano, Taranto, Italy, *DX Listening Digest*)

6713-USB, Radio Bukavu was off the air for nearly a year and has been heard again in Feb at 1545-1658* in French, Swahili, African songs (Mahendra Vaghjee, Mauritius, *Electronic DX Press*)

COSTA RICA This is a "make or break" year for RFPI. Either it will grow, or disappear from the air. More new Friends of RFPI are very much needed. This will lead to matching funds. Join for \$40 to RFPI, P.O. Box 20728, Portland, OR 97294 (James

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming;
+ = continuing but not monitored; 2 x freq = 2nd harmonic; A-00=midyear season, March 26-October 29, 2000; [non] = Broadcast to or for the listed country, but not necessarily originating there.*

and Debra Latham, RFPI *Mailbag*) Additional times this quarter, through May at least, for *World of Radio*: Thu 2300, repeating Fri 0700, 1500, the first airing only one day after production. A new program on RFPI, *Honoring Mother Earth: Indigenous Voices* focuses on protecting Mother Earth, defending native lands and indigenous peoples throughout the world: Monday, 2030; Friday, 1600 plus repeats (Joe Bernard, RFPI) RFPI, 25930-USB, was not only on the air, but audible as late as 0415 UT Sat March 11. MUFs were really skewed high that night, as 15049 was much better than 6975 (gh)

Radio Casino, 5954.1, is on most days, but usually signs on quite late, at variable times after 1200. Noted several times at 1300, but not much of a signal by then (Hans Johnson, FL, *Cumbre DX*)

CZECH REPUBLIC R. Prague programmes:

Mon *Spotlight*, magazine
Tue *Talking Point*, a look at issues
Wed *Ten Years After*, demise of Iron Curtain
Thu *Economic Report*, business news
Fri *Living Czech*, Czech language [lessons?]
Mailbox, listeners' letters
Sat *The Arts*, cultural scene
Saturday Music
Sun *From the Weeklies*, from the periodicals
Letter from Prague, from a personal view
Czech Literature
(via Nick Sharpe, World DX Club *Contact*)

ECUADOR 2480.24, Radio Sonorama (harmonic 2 x 1240) at 0946, Andean vocals, canned ID, fast talking announcer. Drifting slightly. Good peaks (Mark Mohrmann, VT, *DX Listening Digest*)

ETHIOPIA R. Ethiopia external service sometimes switches 7165 transmitter to 7175 in order to jam Eritrea. Radio Ethiopia domestic service was heard on listed 5990, 7110 and 9704.2 (though not all at the same time). Voice of Peace continues at 1100-1200 on 9560 and 11801.9. However, the 1900 broadcast is no longer heard (Chris Greenway, Kenya, *DX Listening Digest*)

FINLAND For A-00, YLE R. Finland English to NAM is 0000-0100 Sunday only, 0100-0105/0110 daily with 500 kW each on 11985 at 310° and 13770 at 325° (Arto Muijnen, Finland, *DX LISTENING DIGEST*) English cut to 15 minutes, news only; R. Finland is not obliged to broadcast in English at all (Andy Sennitt, RN *Media Network*)

GERMANY DW gone commercial: in German at 1622 UT Sat Feb 26 on 17730 kHz they had two ads. One for Opel cars and another for long distance call rates of DTK (Joe, *swtalk*)

GREECE [non] V. of Greece revamped its sked to Europe in Feb so that each language has 30 minutes, including English then at 1900 on 1386, 7475, 9375 (*PanView*, Bulgaria)

VOG via VOA 17565 and 17705 still had *It's All Greek To Me*, "the only music show that speaks English" Sundays starting at 1906 UT, tho announced as "every Sunday at 6 o'clock in the afternoon," which would be 1600 UT for the original. Still good listenable audio (gh)

GUATEMALA While preparing this column, I discovered a brand new SW station! Bandscanning March 17 at 1136, came upon music on 4052.5 kHz, or a tad below that (no, not a typo, not a harmonic, not in the 60 meter band and not an image) – *I've Been Working on the Railroad* on the banjo; 1145 ID: "Radio Verdad, en la frecuencia de 4.05 megahercios en la banda de 75 metros, TGW-1 (??), desde Monterrey(?), Chiquimula, Guatemala, Centroamérica." Invited reports to Apartado Postal 5, Chiquimula, Guatemala. "Radio Verdad, la emisora educativa y evangélica." Fading out by 1226, almost sunrise in Enid (Glenn Hauser, OK)

IRAN [non] V. of Mojahed, in Feb at "0227-0530" on 5350v 5650v 6250v 6450v 6850v 7050v 7450v 7850v 8350v 8850v 9350v. The station jumping in steps of $n \times 10$ kHz. QRM: jammer. Other program monitored "1427-1832" on the same freqs as in the morning; in Farsi with ID: *Seda-ye Mojahed, seda-ye Mojahedine Khlaje Iran*. (Robert Petraitis, Lithuania, *BC-DX*)

IRAQ In March, R. Iraq International would appear on 11787 about once a week, not always the same night, with English, French and even German programs at odd times. Tnx to a tip from John Figliozzi, RII was heard in English on 11787, on a UT Sun from 0225 tune in; 0247 opening German! Strong signal, but ME flutter, and a slight het. 0355 opening in French. 0447 recheck, unID language, not Arabic. 0509 Qur'an with long pauses. The signal was often good, but with a whine on carrier, and long periods of dead air (gh)

It's most probably one of the sixteen 500 kW Thomson transmitters that were installed at Salah El Deen in the 1980s. Most have been silent since the Gulf War, despite Baghdad's claims that it had refurbished them. *Sawt al Jamaheer* (Voice of the Masses) recently restarted as a separate service, so it appears that they are gradually getting more equipment back on the air (Andy Sennitt, Holland, *swprograms*)

[non] V. of Islamic Revolution in Iraq, heard on 6195 under BBC WS and on // 6065, 6095, 7295 at "0330-0530" via VOIROI Iran, in Arabic with ID: *Sawt al-Thawrah al-Islamiyah fi al-Iraq*. Previously heard on 12015 instead of 6065 (Robert Petraitis, Lithuania, *BC-DX*)

IRELAND [non] RTE A-00 registrations via Merlin with CIRAF target zone, site, power, azimuth:

15315 1800-1830 39 Skelton 300 110
13725 1830-1900 4,6-9 Sackville 250 277
21630 1830-1900 46-48,52,53 Ascension 250 085
6155 0130-0200 10,11 Rampisham 500 275 (*BC-DX*)

RTE is in a one-year experiment using Merlin only for all its SW relays. Anyone who would like to comment on this compared to coverage effectiveness via previous WWCR relays is invited to contact Adam at WWCR (*Ask WWCR*)

JORDAN R. Jordan in English to Europe and North America observed: 1100-1300 on new 17680, 1300-1730 on 11690 (Tony Rogers, UKoGBaNI, *BDXC-UK E-Mail News*) Now should be one UT hour earlier

KASHMIR [non?] V. of Jammu Kashmir Freedom, clandestine on 5101.3 at *1300-1430*, tentative, included portions in English at 1401 one day, 1415 the next (Walt Salmani, Grayland WA, *DX Listening Digest*)

KURDISTAN V. of Iraqi Kurdistan on new 9495 with a strong signal here in Feb in Arabic and Kurdish: "0345-0645" on 9495 & 4085. 9495 starts late - about 0405v. In daytime I heard "1545-1832" on 9495 & 4085. ID in Ar: *Sawt al-Kurdistani al-Iraq*; ID in Kurdish: *Aira dangi Kurdistan Iraqa* (Robert Petraitis, Lithuania, *BC-DX*)

MÉXICO Strong winds March 9 caused antennas of R. Mil to collapse. This affected the Núcleo Radio Mil MW stations (R. Mil, La Pantera, and R. Sinfonía). The SW XEOI 6010 antenna is also on the side. Only XEOY 1000 kHz was back on the air quickly, low power with backup antenna (Héctor García Bojorge, Mexico City, *DX Listening Digest*)

XERTA confirmed reactivated on 4800.5, from tune-in 0400, music and announcements very distorted, but at 0539 and 0542 got definite XERTA, Radio Transcontinental de América IDs. Still claims to broadcast in Spanish, French and English. Tnx to a tip the night before from David Zantow (Glenn Hauser, OK, *World Of Radio*)

Radio México Internacional has a DX program, *Estación DX*, conducted by our friend Juan José Miroz L., who besides being a DXer, is a ham who can be contacted on the bands. This program airs every Wednesday at 0300, repeated Saturdays 2100, Mondays 0300. A new QSL card came out a few months ago; Write to them at Radio Mexico Internacional, A.P. 21-300, 04021 México, DF. Tel. 5604-7846 and 5628-1720. E-mail: rmi@eudoramil.com URL: <http://hello.to/rmi> (Iván López Alegría, Aztlán, Nayarit DX Club, Tepic) Times would be one UT hour earlier for DST

NEW ZEALAND RNZI schedule revises again May 7, but until then planned to use 17675 until 0705, then 15115 after 0706. The RNZI Audio Archive and topical Pacific New Bulletins, and a live audio stream available at <http://www.rnzi.com> (Adrian Sainsbury, Frequency Manager, Radio New Zealand International)

OMAN R. Sultanate of Oman, 15355, 0245-0405+: English at 0300-0400; tune-in at 0245 with ME music. Big Ben chimes at 0300, followed by English religious talk and introduction to Koran. Koran recitations in Arabic, and English translations with commentary of the verses recited. Time pips at 0315, ID and 10 minutes of English news by woman to 0325. Promos for upcoming FM programs followed by *Good Morning, Oman*, English program with local and US pops, list of local events and a lot of chatter by all female studio staff. Back to Arabic programming after 0400. Very good (Brian Alexander, PA, *DX Listening Digest*)

PAKISTAN R. Pakistan occasionally heard on 9593.0 at 1700-1900 in Urdu (Vlad G. Titarev, Ukraine, *BC-DX*) Punch-up mistakes, supposed to be on 9395 (Noël Green, England, *ibid.*)

PAPUA NEW GUINEA 4890: One of the great pleasures of DXing on the Pacific coast is the fun of listening to distant regional stations at armchair level! Superb reception in English at 0912 with *City Hall* program, describing emergencies hospitals face, stabbings, shootings, etc. Then *Greening and Cleaning*, with Port Moresby's garbage collection schedule. Very enlightening program offering a glimpse of local life in PNG (Walt Salmani, Grayland WA, *DX Listening Digest*)

Australian media reports advise that Radio Bougainville has been reactivated on 3325, from new studios and broadcasting facilities at Hutjena (Buka Island), funded by the Australian Government. The project also allowed new equipment to be installed at Rabaul (Radio East New Britain, 3385), and 1000 solar powered wind-up radios are being distributed to schools in Bougainville. Radio Bougainville was formerly known as Radio North Solomons, and it had been forced to use a shared transmitter at Rabaul, following destruction of its own station during civil unrest (Bob Padula, *Electronic DX Press*)

PERÚ 4750.10, Radio San Francisco Solano 0219-0257, a rare catch here, finally IDed. Andean vocals, announcer with TCs and IDs in passing between songs. 0227 short canned ID over song. 0253 announcer with live closing announcement over nice guitar instrumental, followed by a final vocal, and carrier off at 0257. Some SSB QRM, slight warble on carrier. Fair to good signal (Mark Mohrmann, VT, *DX Listening Digest*)

New station on 5300.02, Radio Superior, March 2 1027-1115, sign-on, Peruvian anthem, nonstop Andean vocals, then IDs; very good until 1115 fade at local sunrise (Mark Mohrmann, VT, *DX Listening Digest*) R. Superior, 5300.1, Bolívar, at "1050 on a Sunday, address as Jirón San Martín 229 en la provincia de Bolívar, Departamento de la Libertad; Humberto Lozano as Gerente-propietario and sked 1030-1530 and 2300-0300 (Rafael Rodríguez R., Colombia, *DX Listening Digest*)

PORTUGAL RDP was putting a spur on 14050 in the 20m band; with the station's coöperation by turning different transmitters off and on it was determined to be produced by this formula: $3 \times 11960 \text{ minus } 21830 = 14050$ (Wolfgang Büschel, *BC-DX*)

[non] RDP Int'l replaced one of its services to Timor via Taiwan: instead of 0400 on 11550, at 1400-1500 on 15345 (Carlos L. R. de Assunção Gonçalves, Portugal, and/via Noel Green, UKoGBaNI, *BC-DX*)

RUSSIA I've been listening to Radio Rossii on 5905 at approximately 1530-1615 UT; also putting out an harmonic on 29525 kHz [5905 x 5]. The harmonic is weak and variable but confirmed //5905. I doubt I would have stumbled across the harmonic without Roger Perkins, owner-operator of Amateur FM Repeater W1OJ near Boston, telling me that he was experiencing AM mode interference on the input frequency of W1OJ, 25920, which kept the output on 29620 keyed up at times.

Another harmonic nuisance on 29160 is easy to hear with lots of "Radio Rossii" IDs such as 1244 and 1300 //fundamental 9720 (Finbarr O'Driscoll,

Ireland, *DX Listening Digest*) BBCM checked 29160 at 1300-1330 GMT – it was parallel with the satellite feed of Russia's Radio/Radio Rossii. Our last full schedule of Russia's Radio had 9720 kHz listed in use at 0600-1500. The HFCC has transmitter site as Riazan at 0630-1500, 240 degrees and 240 kW (Chris McWhinnie, BBC Monitoring, *DX Listening Digest*)

A recording of R. Tatarstan can be found on the Amazon DX Club website; just click on this link: <http://www.geocities.com/capecanaveral/6731/gravacoets.htm> (Djaci Franklin Silva, *radioescutas*)

SA'UDI ARABIA A very interesting situation on 15435 at 1659+ : Tuned in to hear two Arabic stations. Dominant one is Voice of Africa in Libya; the other Saudi Arabia with Big Ben-like gongs at 1700 and every 15 minutes. Both with Holy Qur'an battling it out. No English until snippets from the Sa'udi. So I can confirm some English from Sa'udi Arabia, and not due to a studio error. English again might have been heard at 1738. Maybe a bilingual program? (Walt Salmani, Grayland WA, *DX Listening Digest*)

SOLOMON ISLANDS Radio Hapi Isles, SIBC's National Service is installing a new 10 kW transmitter (made by Omnitronics, Philadelphia) at the Henderson Transmitting Station, 13 km east of Honiara. It will replace the old 10 kW unit on 5020 kHz, which was running at only 5 kW during the past few years. After overhauling it, the old transmitter will remain as a stand-by. SIBC uses 5020 // 1035 MW at 1900-1200. In co-operation with the Ministry of Education, SIBC may reintroduce 9545 kHz for an Educational Service to the outer islands (Maarten Van Delft via Dave Kenny, BDXC-UK *Communication*)

5019.14: SIBC with very good reception, //mediumwave 1035. At 0941, long long spot about goods available at Golden Star Trading Corporation in Honiara... "toilet freshener, Sunlight soap, orange and coconut juice, price only \$8.20. You look by yourself and you buy them. All sizes. Buy twenty five, you get one free." 1000 into English news from the SIBC. Population of Guadalcanal wants to stop or limit the internal migration to their island. Mentions of Commonwealth Day, theme communications challenges. Serious lack of parking facilities in Honiara city. Tree planting areas are being used for car parks instead. "You are listening to the Solomon Islands Broadcasting Corporation in Honiara", at 1004. No mentions of the Happy Isles. Superb reception, versus the previous evening when nothing was heard (Walt Salmani, Grayland WA, *DX Listening Digest*) Note frequency almost 1 kHz low; was this the case before? Might be sign expected new transmitter in use (gh)

SOMALIA 7530. R. Hargeisa, apparently ex-7071, reactivated after off for a long period, apparently "1600-1900" with clear ID at 1830, 1850 news (Mahendra Vaghjee, Mauritius, *hard-core-dx*) According to my observations on 7530 kHz, Radio Hargeysa is in USB and carrier only, LSB missing (Harald Kuhl, Germany, *DX Listening Digest*)

Any listing of Somali stations is likely to go out of date pretty quickly, but as of early March:

6823 - Radio Mogadishu, Voice of Somali Pacification (pro-Uthman Ali Ato)

6900 - Radio Kismaayo (new station) at 1600-1730

7012 - Radio Gaalkackyo at 1600-1700

7214 - Radio Banaadir at 1600-1900 (a slight change from 7213)

7530 - Radio Hargeysa (Chris Greenway, Kenya, *DX Listening Digest*)

R. Kismaayo broadcasts from the southern Somali port of that name, first heard in March, 1600-1730 daily in Somali on 6900v (BBC Monitoring)

R. Banaadir, 7213v, "1600-1900" including organ music with IDs (Mahendra Vaghjee, Mauritius) Banaadir is the region around Mogadishu (Chris Greenway, England, *DXLD*) Concerning the backing of R. Banaadir and the origin of its equipment: According to Sam Voron's Somali contacts, this is a commercial station. The equipment was brought into the country by two Somalis from Canada ((c) Hans Johnson, *Cumbre DX*)

SOUTH AFRICA Channel Africa's Sat/Sun English at 1300-1455 planned new 21725 ex-21530 (*Observer*, Bulgaria)

SUDAN This country has changed time zones, moving clocks forward so that local time is now GMT+3. This means that all broadcasts from Omdurman are one hour earlier, according to GMT. This accounts for change in Radio Omdurman's English service (now 1700-1800) noted by DXers earlier this year. Omdurman's sole SW transmitter appeared to be off the air, nothing heard on 7200. Opposition station Voice of Sudan (from Eritrea) was heard on 8000, 9000 and 9517.2 (Chris Greenway, Kenya, *DX Listening Digest*)

SYRIA R. Damascus registered Adra site for A-00 new 17830 with 500 kW at 0100-2200 on various beams (*Observer*, Bulgaria)

SWITZERLAND The most interesting, best produced program on Swiss Radio International-World Radio Switzerland is being dropped. SRI refuses to give any reason. Programs like *Tourism Rendezvous* bring some face to a faceless station like SRI. Switzerland is not as boring as SRI makes it and *Tourism Rendezvous* really brings the place alive. It's really good radio! I'M ASKING YOU to write an email asking that the program continue each Sunday. Please send to: English@sri.ch with a copy to Ron.Popper@sri.ch (Larry Nebron, *swprograms*)

TAIWAN New Star Radio, presumed, 13750 in clear with no TIDGS at 1310 tune-in to 4-digit Chinese YL numbers, each group twice; distorted with hum, which continued after closing announcement 1314 and open carrier. Resumed at 1330 with music, ID twice ending with "Guangbo diantai", and shortly back to numbers. At 1350 recheck in OC again, and also found much weaker carrier on 15388, another of its traditional frequencies. 1357 on 13750 music, 1400 Chinese music and talk but now co-channel QRM, India? 15388 sounded very similar but not synchronized //. 1401 some music on 15388 started several seconds after it started on 13750 (Glenn Hauser, OK, *DX Listening Digest*)

UK o G B a N I Merlin Network One : the 24-hour satellite/ SW service that provided airtime for various broadcasters closed its satellite service at the end of February with some customers (such as Stafford Broadcasting Society and Wales Radio,

International) continuing on SW only as broadcasts in their own right (i.e. not part of MNO). MNO's purpose-built London studios which were only recently completed will be abandoned. The two technical operators who have been running MNO since the departure of Eric Wiltsher last year, will lose their jobs (Rob Leighton, Stafford Broadcasting Society, Shaun Geraghty, *Radio Magazine*, via British DX Club *Communication*)

Spreading the Word Worldwide. Affiliated Media Group, Jacksonville FL, is excited to present The African Beacon, the most powerful short wave radio broadcast network in all of Africa. The "World Beacon African Service" provides Africa's half billion person population with quality inspirational programming seven days a week. Rates for ministries are \$1,050 per week for a daily 15-minute program. Affiliated Media Group has rights to use previously idle Cold-War-era Merlin transmitters in the UK for this 8 hours per evening starting April 3; and subsequently expand to cover the rest of the world. See <http://www.affiliatedmedia.com> (Michael Moore, FL via gh)

USA WBCQ-2, 9340-USB with reduced carrier, started in Feb with nothing but the apocalyptic Christian Media Network M-F only at 2200-0700, with daytime and weekends still open; then added *World of Radio* Fri 2130, shifting to 2030 during DST (gh)

WINB registered for A-00: 1600-2400 13570, 0000-0400 12160 (*Observer*, Bulgaria)

After three years as Director of the News Division, Sonja Pace has been selected as the new Chief of the VOA Moscow Bureau. We thank Sonja for her dedication and leadership in the Newsroom and look forward to hearing her back on the air. Although she will not leave for Moscow until mid-summer, Sonja will depart from the Newsroom shortly to begin intensive language and area studies courses. As the VOA newsroom evolves into a multimedia operation, we will be redesigning the position of News Director to supervise our radio, television, and Internet news output. We will recruit both internally and externally for someone who can fulfill this role and hope to have a new VOA News Director in place by the time the multimedia newsroom opens on the first floor in the fall. Veteran correspondent Andre De Nesnera has agreed to serve as Acting Director of the News Division (Sanford J. Ungar, Myrna R. Whitworth, VOA press release via Kim Andrew Elliott) S. Pace was the subject of a newsroom petition to remove her (gh)

The former VOA site in Bethany, Ohio, now known as Union Township, may become a Cold War Museum, the first of its kind in the US (Michael D. Clark, Cincinnati *Enquirer* via Fred Vobbe, NRC)

Projected *World of Radio* sked on WWCR: Thu 2030 15685, Fri 0930 7435, Sat 0300 3215, 1130 15685, Sun 0230 and 0630 5070, Mon 0000 3215 (June-August 9475), 0500 3210, Tue 1100 15685.

VANUATU 4960: Superb reception, at 0936 too of Radio Vanuatu, in Bislama with religious sermon. "Help most northern part of Vanuatu. Help most southern part of Vanuatu. Help most eastern part of Vanuatu. Help most western part of Vanuatu. Invite Holy Spirit, you come. Bless the nation. Direct this nation... Alleluia..." Carrier on, but no programming when rechecked after 1000 (Walt Salmani, Grayland WA, *DX Listening Digest*)

Radio Vanuatu reactivated 7260 with 10 kW, at 2100-0500. At 0500-1115 and 1900-2100 either 3945 or 4960 will be used. Radio Vanuatu belongs to VBTC (Vanuatu Broadcasting & TV Corp.) and has this E-mail address: vbtnews@vanuatu.com.vu (Maarten Van Delft, via Dave Kenny, BDXC-UK *Communication*)

VENEZUELA Typo in the original of last month's list: R. Valera is on 4840, not 4940 (gh)

WALES [non] Wales Radio, International, via Merlin, Skelton, England: Fri 2030-2100 7325, Sat 0200-0230 9795, 1230-1300 17650 (Merlin via Wolfgang Büschel)

WESTERN SAHARA [non] UnID on 7470.00 for one hour only 0701-0801* Some French, Arabic, and Sahel music. Closed with anthem on brass band (Wolfgang Büschel, Germany, *DX Listening Digest*)

The Polisario station National Radio of the Saharan Arab Democratic Republic heard from tune-in at 2150 with Saharan music, full ID and news in Arabic at 2200 on new 7470 kHz – fair signal strength but quite low mod. Also confirmed at same time in parallel on 1540 kHz mediumwave (very weak but occasionally audible in peaks) using the Wellbrook K9AY loop. National Radio of the SADR has reportedly used various shortwave frequencies in the past (probably only sporadically), but has rarely been confirmed by DXers on SW. The MW frequency had also been absent during the past couple of weeks – it recently moved from 1550 to 1540 kHz and now suffers bad splatter in the UK from the various European stations on 1539. 7470 was still clear – 100% audible – at 2220 (Thanks to Noel Green, Wolfgang Bueschel and Chris Greenway for earlier tips on 7470) (Dave Kenny, Caversham, England, *DX Listening Digest*)

(Arabic: *al-idha'at al-wataniyah li al-jumhuriyah al-arabiyah al-sahrawiyah al-dimuqratiyah*), supports the Polisario Front, hostile to Moroccan policy on Western Sahara. Has been observed by BBC Monitoring since 1979. According to web site, it broadcasts from Bir Lehlou in a Polisario-controlled part of Western Sahara, about 200 km south west of Tindouf, Algeria - although this has not been confirmed. Address: Polisario Front, BP 10, El Mouradia, Alger, Algeria. Web Site: <http://web.jet.es/rasd> (Contains RealVideo from TV Saharaui). Daily 0700-0800 and 1800-2300 in Arabic, 2300-2400 in Spanish with news at 0730 (exc Fri), 1900, 2000, 2200, 2305 on 1540, 7470 (BBC Monitoring)

7470 kHz heard from 2230 tune-in to sign-off at 2359. Good reception till 2300, then disturbed by co-channel Radio Free Asia. You can hear an audio clip of this station in the Clandestine section of the Interval Signals Archive at <http://home.clara.net/dkernick> (Dave Kernick, UK, *hard-core-dx*) We heard it too with brief rustic anthem at 0001* (gh)

Until the Next, Best of DX and 73 de Glenn!

Broadcast Logs



Gayle Van Horn

0030 UTC on 13695

THAILAND: Radio Thailand. Station ID, "This is HSK9 Radio Thailand Broadcasting from Bangkok." *Thai Culture* program to world news, national weather. Good signal; however, distorted audio, best monitored in upper side band. (Joe Talbot, USA/Hard Core DX)

0042 UTC on 6535.7

PERU: Radio Huancamba. Spanish. Mix of campesino and Andean vocals. Echo ID jingles between tunes to 0045. Occasional interference from 6535. (Harold Frodge, Midland, MI) Peruvians monitored as; **Radio Tawantinsuyo** 6173.8, 2000, & 2305-2320. **Radio Quillabamba** 5025, 2245-2300; **Radio Horizonte** 5018.7, 2300-2305; **Radio Ancash** 4990.9, 2305-2315; **Radio Huanta** 4746.5, 2350-0005; **Radio Paucartambo** 6520.4, 2315-2330. (Michael Schnitzer, Hansfurt, Germany/HCDX) **Radio Ondas del Rio Mayo**, Nueva Cajamarca 6797.5, 2320-2328. IDs plus Andean vocals. (Mark Veldhuis, Borne, Netherlands/HCDX) Tentative on **Ondas Rio Marañon** 6673.9, 2359-0009+. Mentions of "Ondas," plus Andean vocals and mention of Amazonas, the region for this station, signal best in lower side band. (Frodge, MI) **Radio Superior** 5299.9, 0945. (Richard Jary, Sydney, Australia/HCDX)

0215 UTC on 4919

ECUADOR: Radio Quito. Spanish ID, "Radio Quito la voz de la Capital" to easy-listening vocals and political commentary at 0218. (Frodge, MI)

0247 UTC on 6265

ZAMBIA: Radio One. Heard with fair to good signal quality. *Fish Eagle* interval signal from 0247 to national anthem. Drum signal to vernacular text. Fair signal also 1628, equal strength to **Radio Two** on 6165. (Walter Salmani, Victoria, BC Canada/HCDX)

0400 UTC on 17675

NEW ZEALAND: Radio New Zealand Intl. Regional music to sports news on America's Cup racing, fading signal quality. (Ben Barry, New York, NY)

0450 UTC on 7500

ROMANIA: Radio Moldova Intl. Noted signal without the audio hum! Copied station's English service at 0450, poor signal quality to 0455*. Subsequent rechecks with hum present again! (Salmani, CAN/HCDX) **Radio Romania Intl** 11940, 2302-2310+ with national/world news. (Frodge, MI)

0510 UTC on 4775

BRAZIL: Radio Liberal. Portuguese commentary to closing "Radio Liberal" identification. Brazilian's noted as; **Radio Clube do Para** 4885, 0537-0701 with a radio debate format; **Radio Nacional** 11780, 2134-2141, with sports commentary to "Nacional" ID. (Harold Frodge, Midland, MI) **Radio Cultura**, Sao Paulo 9615, 2223-2241 with oldies music to ID. (Veldhuis, NLD/HCDX) Fair signal for **Radio Tupi** 9565, 2245-2305. Religious service to "atencao membros da igreja pentacostal," no ID noted. (Daniele Canonica, Muggio, Switzerland)

0520 UTC on 4850

CAMEROON: RTV Cameroon. English commentary on future generations of the nation to 0525. Lite Afro music to "RTV" ID at 0530 to additional commentary on government and democracy. Monitored best in lower side band. (Frodge, MI)

1005 UTC on 6089.96

CHILE: Radio Esperanza. Noted just under Anguilla in Spanish. Occasional fade up to dominate frequency. Too bad the Caribbean Beacon couldn't find another freq. (Salmani, CA/HCDX) Chile's **La Voz Christiana** 21550, 1522. Spanish pop to Caribe and religious music. ID noted as, "palabra de Dios...escuchando Voz Christiana informa ...transmitiendo onda corta..Santiago, Chile." Religious radio drama at 1600 // 17680 fair past 1600. (Frodge, MI)

1527 UTC on 5060.4

CHINA: Xinjiang PBS, Urumqi. Male announcer's Mongolian service with brief pieces of instrumental Asian music. Station IDs of good signal quality. (Veldhuis, NLD/HCDX)

1545 UTC on 6713

DEM REP OF CONGO: Radio Bakavu. Reactivation of station

noted after absence of nearly a year! French service audible on upper side band to Swahili at 1604. National news and reports to African music 1633. French station ID to news bulletin to 1658*. (Mahendra Vaghjee, Rose Hill, Mauritius/HCDX)

1550 UTC on 5005

NEPAL: Radio Nepal. Nepalese text to regional music. Identification audible as "Radio Nepal," fair signal quality. (Canonica, SU)

1556 UTC on 4925

INDONESIA: RRI-Jambi. Indonesian. Dangdut songs to remote from **RRI Jakarta**, station interval signal with excellent signal. (Zacharias Liangas, Retziki, Greece/HCDX) **Voice of Indonesia** 2020, 15190. Indo pops, IDs, and commercials to commentaries on human rights. (Tony Prince, Cleveland, OH) Indo's **RRI Banda Aceh** 3905. RRI ID 2015. (Jary, Australia/HCDX)

1605 UTC on 4760

PAKISTAN: Radio Pakistan. English news including "this is Radio Pakistan" ID to program on Islamic teachings. Audible 9593, 1944 with regional music and dictation speed news 1950. (Liangas, GRC/HCDX)

1730 UTC on 15190

PHILIPPINES: Radyo Pilipinas. English/Tagalog. Station sign-on to station's ID, "this is Radyo Pilipinas" to frequency quote 15190, 11815 kilohertz. Good signal noted past 1825. (Robert Jackson, CA) Station address: c/o Philippine Broadcasting Service, 4th Floor, Media Centre, Visayas Ave., Diliman, Quezon City 1103, Philippines. - ed.

1810 UTC on 17870

SOUTH AFRICA: Channel Africa. Sports program including soccer news from Ugandan National Soccer League, Safari auto rally race update, rugby and interview with Kenyan cricket player. French service commencing 1830-1855. (Tony Prince, Cleveland, OH) South Africa's **Adventist World Radio** relay, French service from 2000-2030, English 2030-2059. (Silvi, OH)

1900 UTC on 5020

SOLOMON ISLANDS: SIBC. Sign-on to English station ID, news, religious music to "this is Radio Happy Isles" ID, fantastic signal quality. (Schnitzer, Germany/HCDX)

1921 UTC on 7184

BANGLADESH: Bangla Betar. Signal booming in // 9558.0. Station ID at tune-in followed by a presumed newscast. ID repeat 1927, great signal for 7184 plus only minimal interference on 9558. (Veldhuis, NLD/HCDX)

1949 UTC on 11760

GEORGIA: Georgian Radio. Presumed in English with music program hosted by woman announcer. Music consisted of local, Gregorian chants and very slow, almost hymnal tones. Signal blown away by **Radio Havana Cuba** interval signal at 1956. Otherwise very good signal with somewhat weak but understandable audio. (Mark Fine, Remington, VA) Tentative log on 5040, 1525, IDing as "Radio Khara." (Zacharias Liangas, Retziki, Greece/HCDX)

2057 UTC on 15435

LIBYA: Radio Jamahiriya. English newscast to 2100. Station IDs to "bumper music" and Arabic chat. (Frodge, MI)

2204 UTC on 9737.3

PARAGUAY: Radio Nacional. Spanish sports commentary and interviews. Several "Radio Nacional" IDs. (Frodge, MI)

2222 UTC on 7210.2

BENIN: ORTB. French interview to pop tune and mentions of "Cotonou." Fair signal logged in upper side band to avoid amateur radio interferences. (Frodge, MI)

2331 UTC on 12019

VIET NAM: Voice of. National to world newscast, "Voice of Vietnam" ID. Economic development editorial, fair signal quality. (Frodge, MI) English world news 0238, 5940. (Berry, NY) 4960, 1510-1554, signal audible under **All India Radio**. (Liangas, GRC/HCDX)

Thanks to our contributors — Have you sent in YOUR logs?
Send to **Gayle Van Horn**, c/o Monitoring Times (or e-mail gayle@webworkz.com)
English broadcast unless otherwise noted.

Here Comes the Sun ... Shine Radio

As dependable as the sunshine (the Voice of Turkey's slogan), Sunshine Radio rarely passes up a chance to QSL.

Turkey remains one of the best and most prolific stations broadcasting in 24 foreign languages beamed to Europe, Asia, Africa, Southeast Asia, Australia and North America via seven 500 kW transmitters on shortwave; as well as in analog and digital formats through TURKSAT 1CC, THAICOM-3 and OPUS B3 satellites.

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Undoubtedly, the Voice of Turkey provides its listeners an out-



standing response rate to reception reports; supplying pennants, stickers, program schedules and colorful oversized QSL cards featuring Turkish souvenirs, landmarks, crafts, treasures, as well as tourist literature.

The Voice of Turkey is available via its Internet website at www.tsr.gov.tr. Links include news bulletins and daily programming, reviews, frequency and broadcasting zones, Tourism Radio and a Turkish site at www.trt.net.tr, including Real Audio.

Send your letters and reports to: The Voice of Turkey, P.O. Box 333-06.443, Yenisehir Ankara, Turkey. Couldn't you use some Sunshine Radio?

ALGERIA

Radio Algiers International, 15160 kHz. Full data verification card unsigned, plus schedule and reception report form. Received in 72 days for an English report and one U.S. dollar. Station address: 21 Boulevard de Martyrs, Algiers 16000, Algeria. (Scott Medlin-KF4GNL, Cleveland, TN)

AUSTRIA

Radio Austria Intl, 7325 kHz. Verification on station letterhead plus two station stickers. Received in 17 days for an English report and one IRC. Station address: A-1136 Vienna, Austria. (Anthony Maslanka, Cleveland, OH) www.orf.at/roi/

BOLIVIA

Radio Santa Cruz, 6135 kHz. Full data QSL card. Received in 75 days for a Spanish report and one U.S. dollar. Station address: Emisora del Instituto Radiofonico Fe y Alegria (IRFA), Casilla 672, Santa Cruz, Bolivia. Station email: irfacruz@roble.scz.entelnet.bo Manuel Menez, Spain/Cumbre DX

CANADA

CHNX Halifax 6130 kHz. Full data verification on station letterhead signed by Scott Snailham. Received in 21 days for an English report. Station address: P.O. Box 400, Halifax, Nova Scotia Canada B3J 1K1. Great catch at 50 watts! (Dan Dacus, Russellville, AR)

CKZU Vancouver 6160. Full data station card signed by Dave Newbury. Received in 16 days for an English report and souvenir stamps (returned with reply). Station address: P.O. Box 4600, Vancouver, BC Canada V6B HA2. (Dacus, AR)

CFRX Toronto 6070 kHz. Full data QSL card and letter plus schedule. Received in 32 days for an English report and one IRC. Station address: 2 St. Clair Ave., West, Toronto, Ontario Canada M4V 116. (Maslanka, OH)

Radio Canada International, 7235 kHz. Full data QSL card, plus letter, pennant and schedule. Received in 15 days for an English report and one IRC. Station address: P.O. Box 6000, Montreal, Canada H3C 3A8. (Maslanka, OH) Website: www.rcinet.ca

GERMANY

Bayerischer Rundfunk 6085 kHz. Full data antenna card unsigned. Received in 18 days for an English report, two IRCs and souvenir postcard of Missouri. Station address: Rundfunk, Technische Information, D-80300 Munich, Germany. (Bill Willkins, Springfield, MO)

Sudwestrundfunk 7265 kHz. Full data globe card signed by Dieter Dangell. Received in 28 days for an English report, two IRCs and souvenir postcard. Station address: Technische Information, Neckarstrasse 230, D-70190 Stuttgart, Germany. (Wilkins, MO; C. Crawford, KY/Cumbre DX)

Mitteldeutscher Rundfunk 6085 kHz. Full data color MDR logo card with illegible signature, plus station sticker, program/freq booklet and brochure. Received in 32 days for a German report, one U.S. dollar (returned with

reply) and a self addressed envelope plus label (not returned). Station address: Kantsrasse 71-73, Leipzig, Germany. (Gayle Van Horn, Brasstown, NC)

MEDIUM WAVE

Topolna-Czech Rep. 270 kHz AM. Full data QSL card. Card notes they are using 2 DRV transmitters with a power of 750 kW, antenna is a 2/4 vertical. Station address: Ceske Radiokomunikace a.s., Oblast Jizni Morava, RKS AM1 Topolna, 687 11 Topolna, Czech Republic. (Rudd Vos, Netherlands/Hard Core DX)

KLO 1430 kHz AM. Very nice QSL letter on *Unforgettable KLO* letterhead, signed by Arlene Harris-Office Manager. Received in 285 days for an AM report and one U.S. dollar. Station address: 4155 Harrison Blvd., Suite 206, Ogden, UT 84403. Letter states the station was 5kW when I heard them, but has since changed to 10 kW/U2 with a new transmitter site at Layton, Utah; as well as being the second oldest station in the state, signing on in 1924. Morning show announcer Len Allen has worked at the station for 53 years! (Patrick Griffith, Westminster, CO)

KPRO 1570 kHz AM. Verification letter unsigned. Received in three days for an AM report. Station address: 7351 Lincoln Ave., Riverside, CA 92504. (Patrick Martin, Rancho Mirage, CA)

WILM 1450 kHz AM. Full data QSL card and personal letter signed by Allan Loudell-Station Manager, plus stickers, program schedule and WILM balloons. Received in six days for an AM report of DX test. Station address: P.O. Box 1990, Wilmington, DE 19899-1990. (Ben Loveless, Bloomfield, MI)

TIS/TRAVELERS INFORMATION STATION

Los Angeles, CA., 1630 kHz. QSL letter signed by Shelia Gonzales-P.R. Manager. Received in 13 days for a utility report. Station address: 1201 S. Figueroa St., Los Angeles, CA 90015. (Martin, CA)

Pascadero, CA, 1680 kHz. Verification letter signed by Anthony T-Yuson-San Mateo County ISD, plus small photo of 10W transmitter. Received in 3 weeks. Station address: 455 County Center, Redwood City, CA 94063. (Martin, CA)

UGANDA

Radio Uganda, 4976 kHz. Full data letter signed by Rachel Nakibunka. Received in 26 months for an English report and one U.S. dollar. Station address: P.O. Box 7142, Kampala, Uganda. (Greg Myers, VA/Cumbre DX)

VATICAN CITY STATE

Vatican Radio, 7304, 9605 kHz. Full data card unsigned, plus souvenir postcards, personal note, large station poster *Listen For Heavens Sake*, program schedule and book on Radio Vaticana. Received in 26 days for an English report and souvenir postcard. Station address: 00120 Citta del Vaticano, Vatican City State. (Van Horn, NC) www.vatican.va

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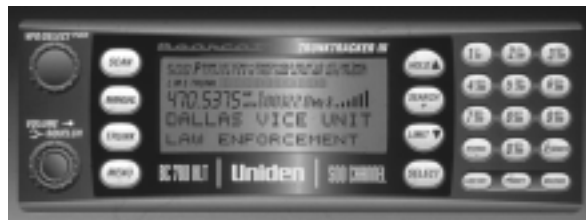
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 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③ followed by the station name ④ (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the *days of broadcast* ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s Sunday
 m Monday
 t Tuesday
 w Wednesday
 h Thursday
 f Friday
 a Saturday

In the same column ⑥ *irregular broadcasts* are indicated "tent" and programming which includes languages besides English are coded "vl" (*various languages*).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with

confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the *target area* ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af: Africa
 al: alternate frequency (occasional use only)
 am: The Americas
 as: Asia
 au: Australia
 ca: Central America
 do: domestic broadcast
 eu: Europe
 me: Middle East
 na: North America
 om: omnidirectional
 pa: Pacific
 sa: South America
 va: various

Consult the propagation charts.

To further help you find a strong signal, we've included a chart on page 64 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours – space does not permit 24-hour listings. Our program manager changes the stations and programming featured each month to reflect the variety available on shortwave, though BBC programs are almost always included.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The capital letter stands for a day of the week, using the same day codes as in the frequency listing (see above), and the four digits represent a time in UTC.

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PROGRAM HIGHLIGHTS

JIM FRIMMEL, PROGRAMMING MANAGER

Remember when the BBC began splitting their programs into different streams? It happened back on April 1st, 1995. They called this new chapter in their long history "slipstreaming." Up until that day, the Beeb broadcast all its programs simultaneously on all frequencies to all parts of the world. But on that memorable day programs started being "streamed" to five different areas of the world: (1) Europe, Middle East, and Southwest Asia, (2) Africa, (3) South Asia, (4) Asia-Pacific, and (5) Americas.

Two years later the BBC reduced the number of streams to three by combining the Europe stream with the Americas stream and the South Asia stream with the Asia Pacific stream. The streams were then renamed (1) AE, (2) AF, and (3) AS. Despite this attempt at simplification, there continued to be alternative programming for specific regions of the Americas, the Caribbean, Asia, and the Falkland Islands.

Well, they did it again. BBC World Service began new scheduling beginning on April 3rd. Programs are now arranged by category to seven different parts of the world. They no longer use the term "streams" but programming is now divided up to these regions (with a certain amount of overlap): (1) West and Central Africa, (2) Europe and North Africa, (3) East and Southern Africa, (4) the Middle East and countries of the CIS, (5) South Asia, (6) East Asia, Australia and the Pacific, and (7) the Americas.

Program categories and examples of each are (1) News and Current Affairs (including sport), (2) BBC Weekend (plays, music), (3) BBC World Living (*Outlook*, *Off the Shelf*, *Learning Zone*), (4) BBC World Showcase (*Meridian* and music), and (5) World Insight (*Discovery*, *Health Matters*, and *People and Places*). An additional category called "Night Time" is a mixture of all the others.

Broadcasts are grouped by category to the various regions. For example, listeners in the Americas hear News and Current Affairs at 1000-1300, 1600-1700, and 2100-2200; World Living at 1300, 1700, 2300, and 0200; World Showcase at 1400, 1800, and 0000; World Insight at 1500, 2000, and 0100. Night Time programs occur from 0000-0400.

All of the above times are in UTC. *MT* will start listing BBC programs in our centerfold listings beginning next month. Meanwhile, a subscription to *BBC On Air* would really help you to sort out this conundrum.

Selected programs for this month include Bulgaria, KTBN, Netherlands, Taiwan, Slovakia, Spain, VOA, and WBCQ.

Correction: Last month's coverage of satellite programming erroneously captioned the schedule of World Radio Network (WRN) One to North America. The listing should have been labeled WRN1 to Europe via Astra 1B satellite.

FREQUENCIES

0000	0100		Anguilla, Caribbean Beacon	6090am				0000	0100	a	UK, Merlin Network One	3985eu	6180eu	7165eu
0000	0100	vl	Australia, ABC/Katherine	5025do				0000	0100		USA, Armed Forces Network	4278am	6458am	12689am
0000	0100		Australia, ABC/Tennant Creek	4910do				0000	0100		USA, KAJJ Dallas TX	5835va		
0000	0100	vl	Australia, Radio	9660as	12080as	15240as	17580as	0000	0100		USA, KJES Vado NM	7555na		
				17750as	17795as	21740as		0000	0100		USA, KTBN Salt Lake City UT	7510na		
0000	0015		Cambodia, Natl Radio Of	11940as				0000	0100		USA, KWHR Naalehu HI	17510as		
0000	0100		Canada, CBC N Quebec Svc	9625do				0000	0030		USA, Voice of America	7215as	9890as	11760as
0000	0100		Canada, CFRX Toronto	6070do								15185as	15290as	17735as
0000	0100		Canada, CFPV Calgary	6030do								17820as		
0000	0100		Canada, CHNX Halifax	6130do				0000	0100	twhta	USA, Voice of America	5995am	6130ca	7405am
0000	0100		Canada, CKZN St John's	6160do								9455af	9775am	11695ca
0000	0100		Canada, CKZU Vancouver	6160do								13740am		
0000	0029	twhta	Canada, Radio Canada Intl	6040na	9535am	11865am		0000	0100		USA, WBCQ Monticello ME	7415na		
0000	0059		Canada, Radio Canada Intl	5960na	9755na			0000	0100		USA, WEWN Birmingham AL	5825na	9355eu	
0000	0100		Costa Rica, RF Peace Intl	6975va	15050va			0000	0100		USA, WGTG McCaysville GA	5085va	6890am	
0000	0100		Ecuador, HCJB	9745na	15115na	21455va		0000	0100		USA, WHRA Greenbush ME	7580na		
0000	0030		Egypt, Radio Cairo	9900am				0000	0100		USA, WHRI Noblesville IN	5745na	7315na	
0000	0100	s	Finland, YLE/R Finland	11985na	13770na			0000	0100		USA, WINB Red Lion PA	11950am		
0000	0100	vl	Guatemala, Radio Cultural	3300do				0000	0100		USA, WJCR Upton KY	7490na	13595na	
0000	0045		India, All India Radio	7410as	9705as	9950as	11620as	0000	0100		USA, WRNO New Orleans LA	7355na		
				13625as				0000	0100	vl	USA, WWSB Cypress Crk SC	9430am	15285ca	
0000	0015		Japan, Radio/NHK	6050eu	6155eu	9665af	11705na	0000	0100		USA, WTJC Newport NC	9370na		
				11815as	13650as			0000	0100	as	USA, WWBS Macon GA	11900na		
0000	0100		Kiribati, Radio	9810do				0000	0100		USA, WWCR Nashville TN	3215na	5070na	5935na
0000	0100		Liberia, LCN/R Liberia Int	5100do								7435na		
0000	0100		Malaysia, Radio	7295do				0000	0100		USA, WYFR Okeechobee FL	6085na	9505na	
0000	0100	vl	Malaysia, RTM Kota Kinabalu	5980do				0000	0030	vl	Vanuatu, Radio	4960do		
0000	0100		Malaysia, RTM Sarawak	7160do				0015	0045	as	Armenia, Trans World R	6240eu		
0000	0030		Mexico, Radio Mexico Intl	9705am				0015	0100		Japan, Radio/NHK	6050eu	6155eu	9665af
0000	0100		Namibia, NBC	3270af	3289af							11705na		
0000	0100		Netherlands, Radio	6165na	9845na			0030	0100		Iran, VOIRI	9022am	9795ca	11970na
0000	0100		New Zealand, R NZ Intl	17675va				0030	0100	vl	Solomon Islands, SIBC	5020do		
0000	0056		North Korea, R Pyongyang	4405va	11460na	11710na	13760na	0030	0100		Sri Lanka, Sri Lanka BC	4940do	6005as	6075as
				15180na								9730as	15425as	
0000	0100	vl	Papua New Guinea, NBC	9675do				0030	0100		Thailand, Radio	9655as	11905as	13695na
0000	0100		Singapore, Radio Corp Singapore	6150do				0030	0100		USA, VOA Special English	7215as	9890as	11760as
0000	0100		Spain, R Exterior Espana	6055na								15185as	15290as	17735pa
0000	0030		Thailand, Radio	9655af	9680va	11905af						17820as		
0000	0100		UK, BBC World Service	3915as	5965as	5975na	6175na	0050	0100		Germany, Int'l BC Tamil	7150na	7460na	
				6195as	7110as	9410as	9590am	0050	0100		Italy, RAI Intl	6010na	9675na	11800na
				9915eu	11945as	11955as	12095sa	0050	0100	vl	UK, IBC Tamil	9460va		
				15280as	15310as	15360as	17615as							
				17790as										

SELECTED PROGRAMS

Sundays

0000	Netherlands, Radio: Aural Tapestry. David Swatling (or a guest presenter) explores the fields of art, culture, and history.
0000	Spain, R Exterior de Espana: News. A ten-minute summary of world news.
0000	USA, KTBN Salt Lk City UT: In Touch. The Atlanta Bible-teaching ministry of Charles Stanley.
0000	USA, WBCQ Monticello ME: A Different Kind of Oldies Show.
0008	Spain, R Exterior de Espana: Window on Spain. A different region of Spain and its attractions are highlighted each week.
0021	Spain, R Exterior de Espana: Radio Waves. Justin Coe hosts this program for shortwave listeners and DXers.
0030	Netherlands, Radio: Roughly Speaking. Max Oehlenschlaeger and Reza Kartosen cohost an upbeat magazine program for European youth.
0033	Spain, R Exterior de Espana: Poparama. The latest pop music hits in Spain as well as some oldies.
0050	Netherlands, Radio: News. Bulletin of world news at the start of all programs.
0056	Spain, R Exterior de Espana: Program Announcements. Descriptions of Spanish National Radio's programs and schedule information.

Mondays

0000 Netherlands, Radio: Dutch Horizons. See S 1130.
0000 Spain, R Exterior de Espana: News. See S 0000.
0000 USA, KTNB Salt Lk City UT: The Living Way (from 2330). See S 2330.
0000 USA, WBCQ Monticello ME: Radio Newyork International (live).
0012 Spain, R Exterior de Espana: Visitors Book. Some of the foreign personalities who have been in Spain recently.
0020 Spain, R Exterior de Espana: Window on Spain. See S 0008.
0030 Netherlands, Radio: Aural Tapestry. See S 0000.
0030 USA, KTNB Salt Lk City UT: Taking Authority. Bishop Eddie Long from the New Birth Missionary Baptist Church in Decatur, Georgia.

0044 Spain, R Exterior de Espana: Radio Club. Terry Burgoyne answers listeners' letters and record requests.
0050 Netherlands, Radio: News. See S 0050.

Tuesday-Saturday

0000 Spain, R Exterior de Espana: The News from Spain. A half-hour of news about Spain, Europe, and the world. The Spanish weather and cultural scene are also featured.

0000 USA, KTBH Salt Lk City UT: Behind the Scenes. See S 0530.

0030 Netherlands, Radio: News. See S 0050.

0030 Spain, R Exterior de Espana: Press Review. Review of the Spanish and international press.

Tuesdays

0000 USA, WBCQ Monticello ME: The Apocalypse Hour.
0030 USA, KTNB Salt Lk City UT: The Voice of Power. RW Schambach
preaches from Tyler, Texas.
0033 Spain, R Exterior de Espana: Entertainment in Spain. Current favorites
and personalities from the world of stage and screen.
0038 Netherlands, Radio: EuroQuest. See M 1108.
0045 Spain, R Exterior de Espana: A Spanish Course by Radio. A course in
Spanish with English commentary.

Wednesdays

0000	USA, WBCQ Monticello ME: Off the Hook.
0008	Netherlands, Radio: Music 52-15. See T1138.
0030	Spain, R Exterior de Espana: Spanish Music. Popular music currently heard in Spain.
0030	USA, KTBN Salt Lk City UT: Up on Melody Mountain. Betty Jean Robinson sings in Brenthwood, Tennessee.
0038	Netherlands, Radio: A Good Life. See T1108.
0039	Spain, R Exterior de Espana: Kaleidoscope. Spanish cultural life both in Spain and abroad.
0049	Spain, R Exterior de Espana: A Spanish Course by Radio. See T0045.

Thursdays

0000 USA, WBCQ Monticello ME: Idio-Audio.
0008 Netherlands, Radio: Documentary. See W 1138.
0030 Spain, R Exterior de Espana: Spanish Music. See W 0030.
0030 USA, KTNB Salt Lk City UT: Changing Your World. See M 0130.
0038 Netherlands, Radio: Dutch Horizons. See S 1130.
0039 Spain, R Exterior de Espana: As Others See Us. A weekly review
of Spain in the foreign press.
0048 Spain, R Exterior de Espana: A Spanish Course by Radio. See T
0045.

Fridays

0008 Netherlands, Radio: Media Network. See H 1138.
0030 Spain, R Exterior de Espana: Spanish Music. See W 0030.
0030 USA, KTBW Salt Lk City UT: International Intelligence Briefing.
See S 0500.
0038 Netherlands, Radio: Research File. See M 1138.
0039 Spain, R Exterior de Espana: EU Forum. Conversation with a representative of the European Union.
0050 Spain, R Exterior de Espana: A Spanish Course by Radio. See T 0045.

Saturdays

0000 USA, WBCQ Monticello ME: Allan Weiner Worldwide.
0008 Netherlands, Radio: Roughly Speaking. See S 0030.
0030 USA, KTBN Salt Lk City UT: Christian World News. See S 0600.
0032 Spain, R Exterior de Espana: Arts Review. A review of cultural activities in Spain and elsewhere.
0038 Netherlands, Radio: Documentary. See W 1138.
0050 Spain, R Exterior de Espana: A Spanish Course by Radio. See T 0045.



FREQUENCIES

0100 0200	Anguilla, Caribbean Beacon	6090am				0100 0200	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9730as
0100 0200 vl	Australia, ABC/Katherine	5025do						15425as			
0100 0200 vl	Australia, ABC/Tennant Creek	4910do				0100 0130	Switzerland, Swiss R Intl	9885am	9905am		
0100 0200	Australia, Radio	9660as	12080as	15240as	15415as	0100 0200	UK, BBC World Service	5965as	5975na	6175na	6195as
		17580as	17750as	17795as	21725as			9410as	9590am	9915am	11955as
								12095sa	15280as	15310as	15360as
								17790as			
0100 0200	Canada, CBC N Quebec Svc	9625do				0100 0200 a	UK, Merlin Network One	3985eu	6180eu	7165eu	
0100 0200	Canada, CFRX Toronto	6070do				0100 0200	USA, Armed Forces Network	4278am	6478am	12689am	
0100 0200	Canada, CFVP Calgary	6030do				0100 0200	USA, KAIJ Dallas TX	5835va			
0100 0200	Canada, CHNX Halifax	6130do				0100 0200	USA, KJES Vado NM	7555na			
0100 0200	Canada, CKZN St John's	6160do				0100 0200	USA, KTVN Salt Lake City UT	7510na			
0100 0200	Canada, CKZU Vancouver	6160do				0100 0200	USA, KWHR Naalehu HI	17510as			
0100 0200	Costa Rica, RF Peace Intl	6975va	15050va			0100 0200	USA, Voice of America	7200as	9740as	9850as	15300as
0100 0200	Cuba, Radio Havana	6000na	9820na	11705na	13605na			15300as	17740as	17820as	
0100 0127	Czech Rep, R Prague Intl	7345na	9665na			0100 0200 twfha	USA, Voice of America	5995am	6130am	7405am	9455af
0100 0200	Ecuador, HCJB	9745na	15115na	21455va				9775am	13740am		
0100 0115	Finland, YLE/R Finland	11985na	13770na					7415na			
0100 0145	Germany, Deutsche Welle	6040na	6145am	9640na	9700na			5825na	9355eu		
		9765na						5085va	6890am		
0100 0200 s	Germany, Good News World R	9855eu						7580na			
0100 0130 s	Germany, Universal Life	9495as						5745na	7315na		
0100 0130 m	Germany, V of Deliverance	6120na						11950am			
0100 0200 vl	Guatemala, Radio Cultural	3300do						7490na	13595na		
0100 0130	Hungary, Radio Budapest	9560na						9955am			
0100 0200	Indonesia, Voice of	9525va						7355na			
0100 0130	Iran, VOIRI	9022am	9795ca	11970na				9430am	15285ca		
0100 0110	Italy, RAI Intl	6010na	9675na	11800na				9370na			
0100 0200	Japan, Radio/NHK	9660me	11860as	11870me	15325as			11900na			
		15590as	17685au	17835sa	21670pa			3215na	5070na	5935na	7435na
0100 0130	Kiribati, Radio	9810do						6065na	9505na	11750as	15160as
0100 0200	Liberia, LCN/R Liberia Intl	5100do						9540as			
0100 0200	Malaysia, Radio	7295do						5940na			
0100 0200 vl	Malaysia, RTM Kota Kinabalu	5980do						4010eu	4050eu		
0100 0130	Mexico, Radio Mexico Intl	9705am						15235va	15415va	15435va	
0100 0200	Namibia, NBC	3270af	3289af					6240as			
0100 0125	Netherlands, Radio	6165na	9845na					6115na	7160na		
0100 0200	New Zealand, R NZ Intl	17675va						6120na			
0100 0156	North Korea, R Pyongyang	3560va	11735va	15229va	17734va			7290as	9495al		
0100 0200 vl	Papua New Guinea, NBC	9675do						6155eu			
0100 0200	Singapore, Radio Corp Singapore	6150do						7405am	9775am		
0100 0130	Slovakia, R Slovakia Intl	5930na	7300ca	9440sa				7335as	9650au	12055va	
0100 0200 vl	Solomon Islands, SIBC	5020do						9955am			
0100 0200	Spain, R Exterior Espana	6055na									

SELECTED PROGRAMS

Sundays

- 0100 Slovakia, R Slovakia Intl: Slovakia Today. A current affairs program.
- 0100 USA, KTVN Salt Lk City UT: The Hour of Power. Robert Schuller conducts services from the Crystal Cathedral.
- 0100 USA, WBCQ Monticello ME: Radio Free New York (live).
- 0103 Netherlands, Radio: Europe Unzipped. New! Radio Netherlands' look at events in Europe.
- 0103 Slovakia, R Slovakia Intl: News. World and regional news.
- 0110 Slovakia, R Slovakia Intl: Slovak Dailies Front Page Review. A summary of items found in the the Slovak daily papers.
- 0115 Slovakia, R Slovakia Intl: Best of RSI. Replay of a popular program.

Mondays

- 0100 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 0100 USA, KTVN Salt Lk City UT: The Believer's Voice of Victory. Kenneth and Gloria Copeland come into your listening room from Fort Worth, Texas.
- 0100 USA, WBCQ Monticello ME: Radio Newyork International (live).
- 0103 Netherlands, Radio: Wide Angle. See S 1608.
- 0103 Slovakia, R Slovakia Intl: Sunday Newsreel. See S 1633.
- 0107 Slovakia, R Slovakia Intl: Listeners' Tribune. See S 1637.
- 0130 USA, KTVN Salt Lk City UT: Changing Your World. Creflo A. Dollar, Jr. evangelizes.

Tuesday-Saturday

- 0100 Netherlands, Radio: Newline. See M 1200.
- 0100 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 0108 Slovakia, R Slovakia Intl: Topical Issue. See M 1638.

Tuesdays

- 0100 USA, KTVN Salt Lk City UT: Dino. Christian music from Branson, Missouri.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0111 Slovakia, R Slovakia Intl: Slovak Weather News. See M 1641.
- 0113 Slovakia, R Slovakia Intl: Slovak Personalities (biweekly). See M 1643.
- 0113 Slovakia, R Slovakia Intl: Tourism News (biweekly). See M 1643.
- 0130 USA, KTVN Salt Lk City UT: Jesse Duplantis. See M 0600.

Wednesdays

- 0100 USA, KTVN Salt Lk City UT: Cornerstone. Evangelizing by John Hagee and music by the Cornerstone Choir.
- 0100 USA, WBCQ Monticello ME: The Overcomer Ministry.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0109 Slovakia, R Slovakia Intl: Slovakia and the World. See S 0100.
- 0119 Slovakia, R Slovakia Intl: Sports News. See T 1649.

Thursdays

- 0100 USA, WBCQ Monticello ME: The Overcomer Broadcast.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0119 Slovakia, R Slovakia Intl: Business News. See W 1649.
- 0124 Slovakia, R Slovakia Intl: Currency Notes. See M 1643.
- 0130 USA, KTVN Salt Lk City UT: Jack Van Impe Presents. See M 0500.

Fridays

- 0100 USA, KTVN Salt Lk City UT: Get Ready. See M 2330.
- 0100 USA, WBCQ Monticello ME: The Overcomer Broadcast.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.
- 0115 Slovakia, R Slovakia Intl: Back Page News (biweekly). See H 1645.

- 0115 Slovakia, R Slovakia Intl: Culture News (biweekly). See H 1645.
- 0121 Slovakia, R Slovakia Intl: Slovak Kitchen (biweekly). See H 1651.
- 0121 Slovakia, R Slovakia Intl: Slovak Lesson (biweekly). See H 1651.
- 0130 USA, KTVN Salt Lk City UT: This is Your Day!. See T 0530.

Saturdays

- 0100 USA, KTVN Salt Lk City UT: Lakewood Church. John Osteen preaches from Houston, Texas.
- 0100 USA, WBCQ Monticello ME: The Fred Flintstone Music Show.
- 0103 Slovakia, R Slovakia Intl: News. See S 0103.0110
- Slovakia, R Slovakia Intl: Topical Issue. See M 1638.
- 0115 Slovakia, R Slovakia Intl: Social-Political Panorama. See M 1643.
- 0125 Slovakia, R Slovakia Intl: Regional News. See F 1655.
- 0130 USA, KTVN Salt Lk City UT: Ever Increasing Faith. Dr. Frederick K.C. Price evangelizes.

Hauser's Highlights

BULGARIA : R. Bulgaria

A-00 in English showing Plovdiv transmitter site, kW power and azimuths:
 1100-1200 15700 P500/306, 17500 P250/292 to WEu
 1900-2000 9400 P500/306, 11700 P500/306 to WEu
 2100-2200 9400 P500/306, 11700 P500/306 to WEu
 2300-2400 9400 P500/306, 11700 P500/306 to NAM
 0200-0300 9400 P500/306, 11700 P500/306 to NAM
 (Observer, Bulgaria, via DX Listening Digest)

FREQUENCIES

0200 0300	Anguilla, Caribbean Beacon	6090am				0200 0300	Taiwan, Radio Taiwan Intl	5950na	9680na	11740as	11825pa
0200 0300	Argentina, RAE	11710am				0200 0206 a	UK, BBC World Service	15345as			
0200 0300	Australia, ABC/Katherine	5025do				0200 0300	UK, BBC World Service	6195as	6135am	6175na	6185am
0200 0300	Australia, ABC/Tennant Creek	4910do						5975na	9770af	9915eu	11955as
0200 0300	Australia, Radio	9660as	12080as	15240as	15415as			9410as	12095sa	15280as	15310as
		15515as	17580as	17750as	21725as	0200 0300	Ukraine, Radio Ukraine Intl	5905eu	6020va	6030na	6080eu
		4880as						7205eu	7420eu	9560eu	9610eu
0200 0210	Bangladesh, Bangla Betar	9400am	11700na					9785na	9810va		
0200 0300	Bulgaria, Radio	11940as				0200 0300	USA, Armed Forces Network	4278am		12689am	
0200 1215	Cambodia, Natl Radio Of	9625do				0200 0300	USA, KAIJ Dallas TX	5835na			
0200 0300	Canada, CBC N Quebec Svc	6070do				0200 0230	USA, KJES Vado NM	7555na			
0200 0300	Canada, CFRX Toronto	6030do				0200 0300	USA, KTNB Salt Lake City UT	7510na			
0200 0300	Canada, CFVP Calgary	6130do				0200 0300	USA, KWHR Naalehu HI	17510as			
0200 0300	Canada, CHNX Halifax	6160do				0200 0300	USA, Voice of America	7200as	9740as	9850as	11705as
0200 0300	Canada, CKZN St John's	6160do						15250as	15300as	17740as	17820as
0200 0300	Canada, CKZU Vancouver	6155am	9535am	9755am	9780am	0200 0300	USA, WBCQ Monticello ME	7415na			
0200 0300	Canada, Radio Canada Intl	11865am				0200 0300	USA, WEWN Birmingham AL	5825na			
		6975va	15050va			0200 0300	USA, WGTG McCaysville GA	5085va	6890am		
0200 0300	Costa Rica, RF Peace Intl	6000na	9820na	11705na	13605na	0200 0300	USA, WHRA Greenbush ME	7580na			
0200 0300	Cuba, Radio Havana	6200na	7345na			0200 0300	USA, WHRI Noblesville IN	5745na	7315sa		
0200 0227	Czech Rep, R Prague Intl	9745na	15115na	21455va		0200 0300	USA, WINB Red Lion PA	11950am			
0200 0300	Ecuador, HCJB	9475am				0200 0300	USA, WJCR Upton KY	7490na	13595na		
0200 0300	Egypt, Radio Cairo	7285as	9615as	9765as	11965as	0200 0300	USA, WRMI/R Miami Intl	7385am			
0200 0245	Germany, Deutsche Welle	4915do				0200 0300	USA, WRNO New Orleans LA	7355na			
0200 0300	Kenya, Kenya BC Corp	4935do				0200 0300	USA, WSHB Cypress Crk SC	7535ca	9430na		
0200 0300	Kenya, Kenya BC Corp	7295do				0200 0300	USA, WTJC Newport NC	9370na			
0200 0230	Malaysia, Radio	7185do				0200 0300	USA, WVCN Nashville TN	3215na	5070na	5935na	7435na
0200 0300	Myanmar, Radio	3270af	3289af			0200 0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200 0300	Namibia, NBC	17675va				0215 0220	Nepal, Radio	3230as	5005as		
0200 0300	New Zealand, R NZ Intl	11844va	13649va			0230 0300	Austria, Radio Austria Intl	7325na			
0200 0256	North Korea, R Pyongyang	9675do				0230 0300	Hungary, Radio Budapest	9835na			
0200 0300	Papua New Guinea, NBC	9510as	9570na	9690as	11740as	0230 0245	Pakistan, Radio	9640as	15485as	17660as	17895as
0200 0256	Romania, R Romania Intl	11830as	11940as			0230 0300	Philippines, R Pilipinas	11885as	15120as	15270as	
		7115na				0230 0300	Sweden, Radio	7290na	9495al		
0200 0230	Serbia, Radio Yugoslavia	6150do				0230 0257	Vietnam, Voice of	5940na			
0200 0300	Singapore, Radio Corp Singapore	5020do				0250 0300	Vatican City, Vatican R	7305am	9605am		
0200 0300	Solomon Islands, SIBC	7275as	11725sa	11810sa	15575na	0257 0300	Malawi, MBC	3380do			
0200 0300	South Korea, R Korea Intl	6005as	6075as	6130do	9730as						
0200 0300	Sri Lanka, Sri Lanka BC	15425as									

SELECTED PROGRAMS

Sundays

- 0200 Bulgaria, Radio, Radio: News. Ten or fifteen minutes of world and Bulgarian news.
- 0200 Taiwan, Radio Taipei Intl: News. Twelve minutes of world news.
- 0200 USA, KTNB Salt Lk City UT: Carman. Helping youth to think through problems and find positive answers.
- 0200 USA, WBCQ Monticello ME: Radio Free New York (live).
- 0210 Bulgaria, Radio, Radio: News Behind the News. Background to specific items of current affairs.
- 0215 Taiwan, Radio Taipei Intl: Great Wall Forum. Comparing Taiwan with the mainland.
- 0225 Bulgaria, Radio, Radio: Keyword Bulgaria. Interesting facts about things Bulgarian.
- 0230 Taiwan, Radio Taipei Intl: Food, Poetry and Others. The program in which host Paula Chao talks about her personal interests.
- 0230 USA, KTNB Salt Lk City UT: Power Connection. John Jacobs and the power team perform feats of strength.
- 0235 Bulgaria, Radio, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.
- 0240 Taiwan, Radio Taipei Intl: Mailbag Time. Host Carlton Wong reads letters from listeners and plays music requests.
- 0245 Bulgaria, Radio, Radio: Radio Bulgaria Calling. A fifteen-minute program for shortwave listeners.

Mondays

- 0200 Bulgaria, Radio, Radio: News. See S 0200.
- 0200 Taiwan, Radio Taipei Intl: News. See S 0200.
- 0200 USA, KTNB Salt Lk City UT: Praise the Lord. See S 0400.
- 0200 USA, WBCQ Monticello ME: Radio New York International (live).
- 0210 Bulgaria, Radio, Radio: Folk Studio. Myths, legends, customs, and rituals associated with Bulgarian holidays.
- 0215 Taiwan, Radio Taipei Intl: Jade Bells and Bamboo Pipes. Carlton Wong plays Chinese folk and temple music.
- 0225 Bulgaria, Radio, Radio: Plaza Bulgaria. See S 2325.
- 0240 Bulgaria, Radio, Radio: Answering Your Letters. See S 2340.
- 0245 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Tuesday-Saturday

- 0200 Bulgaria, Radio, Radio: News. See S 0200.
- 0200 Taiwan, Radio Taipei Intl: News. See S 0200.
- 0200 USA, KTNB Salt Lk City UT: Praise the Lord (live). See S 0400.

Tuesdays

- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0210 Bulgaria, Radio, Radio: News Behind the News. See S 0210.
- 0215 Taiwan, Radio Taipei Intl: People. An introduction to people from all walks of life in Taiwan.
- 0230 Taiwan, Radio Taipei Intl: Trends. Amanda with weekly sound bites about what's new and happening in Taipei.
- 0245 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Wednesdays

- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0210 Bulgaria, Radio, Radio: Events and Development. See T 1110.
- 0215 Taiwan, Radio Taipei Intl: Taiwan Today. Focus on an aspect of Taiwanese life such as education or a point of interest.
- 0225 Bulgaria, Radio, Radio: Magazine Economy. Economic news briefs and financial developments in Bulgaria.
- 0230 Taiwan, Radio Taipei Intl: Stage and Screen. A look at Taiwanese entertainment and pop culture.
- 0235 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
- 0245 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.
- 0246 Bulgaria, Radio, Radio: Radio Bulgaria Calling. See S 0245.

Thursdays

- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0210 Bulgaria, Radio, Radio: Events and Development. See T 1110.
- 0215 Taiwan, Radio Taipei Intl: Journey into Chinese Culture. Conversation about a particular cultural activity in Taiwan.
- 0225 Bulgaria, Radio, Radio: Art and Artists. See T 2325.
- 0230 Taiwan, Radio Taipei Intl: Hot Spots. A look at the Taiwan music scene.

- 0235 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
- 0245 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.
- 0245 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Fridays

- 0200 USA, WBCQ Monticello ME: The Hour of the Time (live).
- 0210 Bulgaria, Radio, Radio: Events and Development. See T 1110.
- 0215 Taiwan, Radio Taipei Intl: Taipei Magazine. Life in Taiwan.
- 0225 Bulgaria, Radio, Radio: History Club. True stories about the Ottoman Empire period.
- 0230 Taiwan, Radio Taipei Intl: East Meets West. A program about cultural differences.
- 0233 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
- 0245 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.
- 0245 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Saturdays

- 0200 USA, WBCQ Monticello ME: The Right Perspective.
- 0210 Bulgaria, Radio, Radio: Events and Development. See T 1110.
- 0215 Taiwan, Radio Taipei Intl: Kaleidoscope. Spotlight on life in Taiwan.
- 0225 Bulgaria, Radio, Radio: The Way We Live. See H 2325.
- 0230 Taiwan, Radio Taipei Intl: Reflections. The best of Chinese literature.
- 0233 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
- 0245 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.
- 0245 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.



0300	0400		Anguilla, Caribbean Beacon	6090am					0300	0330	Thailand, Radio	9655am	11905am	15460na		
0300	0400	vl	Australia, ABC/Katherine	5025do					0300	0400	Turkey, Voice of	6155va	11655as	21715as		
0300	0400	vl	Australia, ABC/Tennant Creek	4910do					0300	0400	Uganda, Radio	4976do				
0300	0400		Australia, Radio	9660as	12080as	15240as			0300	0400	UK, BBC World Service	3255af	5975na	6005af	6135am	
				1515as	15515as	17580as						6175na	6190af	6195eu	7160af	
				17750as	21725as							9410eu	11730af	11760me	11765af	
0300	0400	vl	Botswana, Radio	4820do								11955as	12095af	15310as	15360as	
0300	0400		Canada, CBC N Quebec Svc	9625do					0300	0400	smtwhf UK, BBC World Service	17760as	17790as	21660as		
0300	0400		Canada, CFRX Toronto	6070do					0300	0330	UK, Merlin Network One	15280as				
0300	0400		Canada, CFVP Calgary	6030do					0300	0400	USA, Armed Forces Network	9735am	6458am	12689am		
0300	0400		Canada, CHNX Halifax	6130do					0300	0400	USA, KAIJ Dallas TX	4278am				
0300	0400		Canada, CKZN St John's	6160do					0300	0400	USA, KATB Salt Lake City UT	5835va				
0300	0400		Canada, CKZU Vancouver	6160do					0300	0400	USA, KTVN Salt Lake City UT	7510na				
0300	0329		Canada, Radio Canada Intl	6155na	9755na	9780na			0300	0400	vl	9975am				
0300	0356		China, China Radio Intl	9690am					0300	0400	USA, KWHR Noalehu HI	17510as				
0300	0400		Costa Rica, RF Peace Intl	6975va	15050va				0300	0330	mtwh	4960af				
0300	0400		Cuba, Radio Havana	6000na	9820na	11705na			0300	0400	USA, Voice of America	6035af	6080af	7105af	7290af	
				13605na								7340af	7415af	9575af	9885af	
0300	0400		Ecuador, HCJB	9745na	15115na	21455va			0300	0400	USA, WBCQ Monticello ME	7415na				
0300	0330		Egypt, Radio Cairo	9475am					0300	0400	USA, WEWN Birmingham AL	5825na				
0300	0345		Germany, Deutsche Welle	6045na	9535na	9640na	9700na		0300	0400	USA, WGTG McCaysville GA	5085va	6890am			
				11750na					0300	0400	USA, WHRA Greenbush ME	7580na				
0300	0310	mtwhf	Greece, Voice of		9375na	9420na			0300	0400	USA, WHRI Noblesville IN	5745na	7315sa			
				12105na					0300	0400	USA, WINB Red Lion PA	11950am				
0300	0400	vl	Guatemala, Radio Cultural	3300do					0300	0400	USA, WJCR Upton KY	7490na	13595na			
0300	0400		Japan, Radio/NHK	17825ca	21610pa				0300	0400	USA, WRNO New Orleans LA	7395na				
0300	0400	mtwhfa	Kenya, Kenya BC Corp	4915do					0300	0400	USA, WSHB Cypress Crk SC	7535eu				
0300	0400	mtwhf	Kenya, Kenya BC Corp	4935do					0300	0400	USA, WTJC Newport NC	9370na				
0300	0400	vl	Lesotho, Radio	4800do					0300	0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na	
0300	0400		Malaysia, Radio	7295do					0300	0400	USA, WYFR Okeechobee FL	6065na	9505na			
0300	0400		Malaysia, Voice of	6175as	9750as	15295as			0300	0315	Vatican City, Vatican R	7305am	9605am			
0300	0400		Namibia, NBC	3270af	3289af				0300	0400	Zambia, ZBC Radio 4	4828do				
0300	0400		New Zealand, R NZ Intl	17675va					0300	0400	vl	3396do				
0300	0400		Oman, Radio Sultanate of	15355va					0305	0310	Croatia, Croatian Radio	7280na				
0300	0330		Pakistan, Radio	6070do					0305	0320	mtwhfa UK, BBC World Service	15360as				
0300	0400	vl	Papua New Guinea, NBC	9675do					0310	0340	Vatican City, Vatican R	9660af				
0300	0330	vl	Philippines, R Pilipinas	11885as	15120as	15270as			0329	0359	sm	6155na	9755na	9780na		
0300	0400		Russia, Voice of Russia WS	7180na	12020na	13665na			0330	0400	Albania, R Tirana Intl	6115na	7160na			
				15470na	15595na				0330	0350	vl	Libya, Voice of Africa	15235va	15415va	15435va	
0300	0330		S Africa, AWR Africa	9835af					0330	0400	vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0300	0330		S Africa, Channel Africa	9525af					0330	0400	Sweden, Radio	9495na				
0300	0330		Serbia, Radio Yugoslavia	7130na					0330	0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na	
0300	0400		Singapore, Radio Corp Singapore	6150do					0330	0357	Vietnam, Voice of	7260as				
0300	0400		Sri Lanka, Sri Lanka BC	6005as	6075as	6130do	9730as		0345	0400	Tajikistan, Radio	7245as	9905as	11620as		
				15425as					0357	0400	vl	Malawi, MBC	5993do			
0300	0400		Taiwan, Radio Taiwan Intl	5950na	9680na	11745as			0359	0400	Zambia, Christian Voice	6065do				
				11825as	15345as											

Sundays

0300 Taiwan, Radio Taipei Intl: News. See S 0200.
0300 USA, KTBN Salt Lk City UT: Eastman Curtis Live. A youth-oriented program.
0300 USA, WBCQ Monticello ME: The Tom and Daryl TVRO Radio Show.
0315 Taiwan, Radio Taipei Intl: Instant Noodles. The secrets to good Chinese cooking.
0330 Taiwan, Radio Taipei Intl: Mailbag Time. See S 0240.
0330 USA, KTBN Salt Lk City UT: Teen Mania. Ron Luce encourages teens to discover a purpose for their lives.

Mondays

0300 Taiwan, Radio Taipei Intl: News. See S 0200.
0300 USA, KTBN Salt Lk City UT: Praise the Lord. See S 0400.
0300 USA, WBCQ Monticello ME: Radio Newyork International (live).
0315 Taiwan, Radio Taipei Intl: News Link. New program.
0340 Taiwan, Radio Taipei Intl: Women in Taiwan. See M 0315.

Tuesdays

0300 Taiwan, Radio Taipei Intl: News. See S 0200.
0300 USA, KTNB Salt Lk City UT: Praise the Lord (live). See S 0400.
0300 USA, WBCQ Monticello ME: The Overcomer Broadcast.
0315 Taiwan, Radio Taipei Intl: Taiwan Economic Journal. Focus on a topic dealing with business.
0330 Taiwan, Radio Taipei Intl: Formosa Oldies. Songs from the past.
0345 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445

Wednesdays

0300 Taiwan. Radio Taipei Intl: News. See S 0200.

0300 USA, KTNB Salt Lk City UT: Praise the Lord (live). See S 0400.
0300 USA, WBCQ Monticello ME: The Overcomer Broadcast.
0315 Taiwan, Radio Taipei Intl: Floating Air. No information available.
0345 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Thursdays

0300 Taiwan, Radio Taipei Intl: News. See S 0200.
0300 USA, KTBN Salt Lk City UT: Praise the Lord (live). See S 0400.
0300 USA, WBCQ Monticello ME: The Overcomer Broadcast.
0315 Taiwan, Radio Taipei Intl: Pages in History. See M 0315.
0330 Taiwan, Radio Taipei Intl: Life Unusual. See M 0315.
0345 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Fridays

0300 Taiwan, Radio Taipei Intl: News. See S 0200.
0300 USA, KTVB Salt Lk City UT: Praise the Lord (live). See S 0400.
0300 USA, WBCQ Monticello ME: The Overcomer Broadcast.
0315 Taiwan, Radio Taipei Intl: Miss Mook's Big Countdown. Miss Mook
plays the latest releases of the popular music of Taiwan.
0345 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Saturdays

0300 Taiwan, Radio Taipei Intl: News. See S 0200.
0300 USA, KTVB Salt Lk City UT: Praise the Lord (live). See S 0400.
0300 USA, WBCQ Monticello ME: The Right Perspective.
0315 Taiwan, Radio Taipei Intl: Health and Fitness Beat. See M 0315.
0335 Taiwan, Radio Taipei Intl: Carol's Cafe. See M 0315.
0350 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Hauser's Highlights

ISRAEL: Israel Radio
A-00 incl. Eng. to Eu/NAm u.o.s.:

0400-0415 9435 15640, AuAs 17535
1030-1035 15640 17535
1400-1430 15650 17535
1900-1925 11605 15650 17535. Af 15640

Spanish, Ladino, daily:

1635-1645	15650 Spanish
1645-1700	15650 Ladino
1945-2000	11605 15640 15650 17535 Spanish

Spanish and Ladino Sat only

1500-1525 11695 17535 17705
(tnx tip from Doni Rosenzweig, via gh)

0400	0500		Anguilla, Caribbean Beacon	6090am					0400	0500		UK, BBC World Service	3255af	3955eu	5975na	6005af
0400	0500	vl	Australia, ABC/Katherine	5025do									6135am	6175na	6190af	6195eu
0400	0500	vl	Australia, ABC/Tennant Creek	4910do									7160af	9410eu	11760me	11765af
0400	0500		Australia, Radio	9660as	12080as	15240as	15415as						11955as	12095af	15310as	15420af
				15515as	17580as	17750as	21725as						15575as	17760as	17790as	21660as
0400	0430	smwfa	Belarus, Radio Minsk	6070eu	7210eu				0400	0500		USA, Armed Forces Network	4278am		6458am	12689am
0400	0430		Belgium, R Vlaanderen Intl	15565am					0400	0500		USA, KAU Dallas TX	5835va			
0400	0500	vl	Botswana, Radio	4820do	7255do				0400	0500		USA, KTVN Salt Lake City UT	7510na			
0400	0500		Canada, CBC N Quebec Svc	9625do					0400	0500	vl	USA, KVOH Los Angeles CA	9975am			
0400	0500		Canada, CFRX Toronto	6070do					0400	0500		USA, KWHR Naalehu HI	17780as			
0400	0500		Canada, CFVP Calgary	6030do					0400	0500		USA, Voice of America	6035af	6080af	7170af	7290af
0400	0500		Canada, CHNX Halifax	6130do									7415af	9575af	9775af	9885af
0400	0500		Canada, CKZN St John's	6160do					0400	0500		USA, WBCQ Monticello ME	7415na			
0400	0500		Canada, CKZU Vancouver	6160do					0400	0500		USA, WEGN Birmingham AL	5825na			
0400	0429	as	Canada, Radio Canada Intl	9505me	9645me				0400	0500		USA, WGTG McCaysville GA	5085va	6890am		
0400	0429	mtwhf	Canada, Radio Canada Intl	9535af	9690af	11795af			0400	0500		USA, WHRA Greenbush ME	7580na			
0400	0456		China, China Radio Intl	9730na					0400	0500		USA, WHRI Noblesville IN	5745na	7315sa		
0400	0500		Costa Rica, RF Paveca Intl	6975va	15050va				0400	0500		USA, WINB Red Lion PA	11950am			
0400	0500		Cuba, Radio Havana	6000na	9820na	11705na	13605na		0400	0500		USA, WJCR Upton KY	7490na	13595na		
0400	0427		Czech Rep, R Prague Intl	7345na	7465na	9435na			0400	0500		USA, WRMI/R Miami Intl	7385na			
0400	0500		Ecuador, HCJB	9745na	15115na	21455va			0400	0500		USA, WRNO New Orleans LA	7395na			
0400	0445		Germany, Deutsche Welle	7280f	9565af	9765af	11965af		0400	0500		USA, WSHB Cypress Crk SC	7535eu	15195af		
0400	0500	irreg	Iraq, Radio Iraq Intl	9685va	11787va				0400	0500		USA, WTJC Newport NC	9370na			
0400	0415		Israel, Kol Israel	9435va	15640va	17535va			0400	0500		USA, WWCR Nashville TN	2390na	3215na	5070na	5935na
0400	0500	mtwhfa	Kenya, Kenya BC Corp	4915do					0400	0500		USA, WYFR Okeechobee FL	6065na	9505na	9985na	
0400	0500	mtwhf	Kenya, Kenya BC Corp	4935do					0400	0500		Zambia, Christian Voice	6065do			
0400	0500	vl	Lesotho, Radio	4800do					0400	0500		Zambia, ZBC Radio 4	4848do			
0400	0500	vl	Malawi, MBC	3380do	5995do				0400	0500	vl	Zimbabwe, Zimbabwe BC	3396do			
0400	0500		Malaysia, Radio	7295do					0405	0410		Croatia, Croatian Radio	7280na			
0400	0500		Namibia, NBC	3270af	3289af				0410	0415	thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0400	0500		New Zealand, R NZ Intl	17675va					0425	0440	vl	Italy, RAI Intl	5975af	7150af		
0400	0500	vl	Nigeria, Radio/Enugu	6025do					0430	0500	mtwhf	Canada				

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FREQUENCIES

0500 0600	Anguilla, Caribbean Beacon	6090am				0500 0600	Uganda, Radio	4976do			
0500 0600 vl	Australia, ABC/Katherine	5025do				0500 0600	UK, BBC World Service	3255af	3955eu	5975na	6005af
0500 0600 vl	Australia, ABC/Tennant Creek	4910do						6175am	6190af	6195eu	7160af
0500 0600	Australia, Radio	9660as	12080as	15240as	15515as			9410eu	9740as	11760me	11765af
		17580as	21725as					11955pa	12095eu	15310as	15360as
0500 0600 as	Australia, Radio	15415as	17750as					15420af	15575as	17640af	17760as
0500 0600 vl	Botswana, Radio	4820do	7255do					17790as	17885af	21660as	
0500 0600	Canada, CBC N Quebec Svc	9625do				0500 0600	Ukraine, Radio Ukraine Intl	4820eu	6020va	6030na	6080eu
0500 0600	Canada, CFRX Toronto	6070do						7205eu	7420eu	9600eu	9610eu
0500 0600	Canada, CFVP Calgary	6030do						9785va	9810va		
0500 0600	Canada, CHNX Halifax	6130do						4278am	6458am	12689am	
0500 0600	Canada, CKZN St John's	6160do				0500 0600	USA, Armed Forces Network	5835va			
0500 0600	Canada, CKZU Vancouver	6160do				0500 0600	USA, KAJI Dallas TX	7510na			
0500 0556	China, China Radio Intl	9560na				0500 0600 vl	USA, KVOH Los Angeles CA	9975am			
0500 0600	Costa Rica, RF Peace Intl	6975va	15050va			0500 0600	USA, KWHR Naalehu HI	17780as			
0500 0600	Cuba, Radio Havana	9550na	9820na	9830na		0500 0600	USA, Voice of America	5970af	6035af	6080af	7170af
0500 0600	Ecuador, HCJB	9745na	15115na	21455va				7295af	9700af	9775af	11825eu
0500 0545	Germany, Deutsche Welle	6100na	6120na	9670na	11795na			12080af	15205as		
0500 0600	Japan, Radio/NHK	6110na	7230eu	9835eu	11715as			7415na			
		11760as	11840as	11850pa	15230pa			5825na			
		15590as						5085va	6890am		
0500 0600 mtwhf	Kenya, Kenya BC Corp	4915do						7435af			
0500 0600 mtwhf	Kenya, Kenya BC Corp	4935do						5475na	7315sa		
0500 0600	Kuwait, Radio	15110as						51950am			
0500 0600 vl	Lesotho, Radio	4800do						7490na	13595na		
0500 0600	Liberia, LCN/R Liberia Intl	5100do						7385na			
0500 0600 vl	Malawi, MBC	3380do	5995do					7395na			
0500 0600	Malaysia, Radio	7295do						7535eu	9840af		
0500 0600	Malaysia, RTM Sarawak	7160do						9370na			
0500 0600	Malaysia, Voice of	6175as	9750as	15295as				2390na	5070na	5935na	
0500 0530 stwhf	Mexico, Radio Mexico Intl	9705am						3210na			
0500 0525	Netherlands, Radio	6165na	9590na					3215na			
0500 0600	New Zealand, R NZ Intl	17675va						5985na	9355na	11550va	
0500 0600 vl	Nigeria, Radio/Enugu	6025do						9660af	11625af	15570af	
0500 0600 vl	Nigeria, Radio/Ibadan	6050do						6065do			
0500 0600 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do			4848do			
0500 0600 vl	Nigeria, Radio/Lagos	3326do	4990do					3396do			
0500 0600	Nigeria, Voice of	7255af	15120va					7285na			
0500 0504	Pakistan, Radio	11725me	15175me	17555me				2390na	3210na	5070na	5935na
0500 0600 vl	Papua New Guinea, NBC	9675do						5890am			
0500 0600	Russia, Voice of Russia WS	7125na	7180na	12010na	12020na			3366do	4915do		
		15470na	15595na	17595na	17660na			6015na	6155va	13730na	15410eu
		5960af	6010af					17870va			
0500 0530	S Africa, AWR Africa	15215af						9810do			
0500 0600	S Africa, Channel Africa	6150do						9655eu	11905eu	15115eu	
0500 0600	Singapore, Radio Corp Singapore	5020do						15435au	17830au	21605au	21700au
0500 0600 vl	Solomon Islands, SIBC	6055na						5975do			
0500 0600	Spain, R Exterior Espana	6055na									
0500 0505	Swaziland, Trans World R	4775af	6100af	9500af							

SELECTED PROGRAMS

Sundays

- 0500 Netherlands, Radio: Aural Tapestry. See S 0000.
 0500 Spain, R Exterior de Espana: News. See S 0000.
 0500 USA, KTBN Salt Lk City UT: International Intelligence Briefing. Hal Lindsey and Cliff Ford with 30 minutes of late-breaking news and commentary.
 0500 USA, WBCQ Monticello ME: The Tom and Daryl TVRO Radio Show.
 0508 Spain, R Exterior de Espana: Window on Spain. See S 0008.
 0521 Spain, R Exterior de Espana: Radio Waves. See S 0021.
 0530 USA, KTBN Salt Lk City UT: Behind the Scenes. TBN news, letters, and reports with Paul Krause.
 0533 Spain, R Exterior de Espana: Poporama. See S 0033.

Mondays

- 0500 Netherlands, Radio: Dutch Horizons. See S 1130.
 0500 Spain, R Exterior de Espana: News. See S 0000.
 0500 USA, KTBN Salt Lk City UT: Jack Van Impe Presents. Reporting and interpreting international news in bible prophecy.
 0512 Spain, R Exterior de Espana: Visitors Book. See M 0012.
 0520 Spain, R Exterior de Espana: Window on Spain. See S 0008.
 0530 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
 0544 Spain, R Exterior de Espana: Radio Club. See M 0044.

Tuesdays

- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
 0500 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1430.
 0508 Netherlands, Radio: Research File. See M 1138.
 0530 Spain, R Exterior de Espana: Press Review. See T 0030.

- 0530 USA, KTBN Salt Lk City UT: This is Your Day!. Evangelizing and healing by Benny Hinn from the Orlando Christian Center.
 0533 Spain, R Exterior de Espana: Entertainment in Spain. See T 0033.
 0545 Spain, R Exterior de Espana: A Spanish Course by Radio. See T 0045.

Wednesdays

- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
 0500 USA, KTBN Salt Lk City UT: Teen Mania. See S 0330.
 0508 Netherlands, Radio: Music 52-15. See T 1138.
 0530 Spain, R Exterior de Espana: Spanish Music. See W 0030.
 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.
 0534 Spain, R Exterior de Espana: Press Review. See T 0030.
 0539 Spain, R Exterior de Espana: Kaleidoscope. See W 0039.
 0549 Spain, R Exterior de Espana: A Spanish Course by Radio. See T 0045.

Thursdays

- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
 0500 USA, KTBN Salt Lk City UT: Rich & Robyn Wilkerson. See S 0600.
 0508 Netherlands, Radio: Documentary. See W 1138.
 0530 Spain, R Exterior de Espana: Spanish Music. See W 0030.
 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.
 0534 Spain, R Exterior de Espana: Press Review. See T 0030.
 0539 Spain, R Exterior de Espana: As Others See Us. See H 0039.
 0548 Spain, R Exterior de Espana: A Spanish Course by Radio. See T 0045.

Fridays

- 0500 Spain, R Exterior de Espana: Spanish Music. See W 0030.
 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
 0500 USA, KTBN Salt Lk City UT: Tommy Barnett and Matthew Barnett. See S 0600.

- 0508 Netherlands, Radio: Media Network. See H 1138.
 0530 USA, KTBN Salt Lk City UT: This is Your Day!. See T 0530.
 0535 Spain, R Exterior de Espana: Press Review. See T 0030.
 0539 Spain, R Exterior de Espana: EU Forum. See F 0039.
 0550 Spain, R Exterior de Espana: A Spanish Course by Radio. See T 0045.

Saturdays

- 0500 Spain, R Exterior de Espana: The News from Spain. See T 0000.
 0500 USA, KTBN Salt Lk City UT: Real Videos. See A 0400.
 0508 Netherlands, Radio: A Good Life. See T 1108.
 0518 Netherlands, Radio: Roughly Speaking. See S 0030.
 0526 Spain, R Exterior de Espana: Press Review. See T 0030.
 0530 USA, KTBN Salt Lk City UT: Fast Forward. Al Denson.
 0532 Spain, R Exterior de Espana: Arts Review. See A 0032.
 0550 Spain, R Exterior de Espana: A Spanish Course by Radio. See T 0045.

Hauser's Highlights

HUNGARY: R. Budapest

A-00 in English, from March 26:

1900-1930	Eu	6025 9750
2100-2130	Eu	6025
2130-2200	Eu	3975
0100-0130	NAm	9560
0230-0300	NAm	9835

(R. Budapest via Hans-Joachim Koch, *DX Listening Digest*)

0600	0630		S Africa, Channell Africa	15215af			
0600	0700		Sierra Leone, SLBS	3316do			
0600	0700		Singapore, Radio Corp Singapore	6150do			
0600	0700	vl	Solomon Islands, SIBC	5020do			
0600	0700		Swaziland, Trans World R	4775af	6100af	9500af	
0600	0630		Switzerland, Swiss R Intl	9655eu			
0600	0700		UK, BBC World Service	3955eu	6005af	6175am	6190af
				6195eu	7160af	9410eu	9580pa
				9740as	11760me	11765af	11940af
				11955pa	12095eu	15310as	15360as
				15420af	15575as	17640af	17760as
				17790as	17885af	21660as	
0600	0700		USA, Armed Forces Network	4278am	6458am	12689am	
0600	0700		USA, KALJ Dallas TX	5835va			
0600	0700		USA, KTBN Salt Lake City UT	7510na			
0600	0700		USA, KWHR Naalehu HI	17780as			
0600	0700		USA, Voice of America	5970af	5995af	6035af	6080af
				7170af	7295af	11805af	11825af
				11930af	12080af	15205as	15600af
0600	0700		USA, WBCQ Monticello ME	7415na			
0600	0700		USA, WEWN Birmingham AL	5825na			
0600	0700		USA, WGTG McCaysville GA	5085va	6890va		
0600	0700		USA, WHRA Greenbush ME	7435af			
0600	0700		USA, WHRI Noblesville IN	5745na	7315sa		
0600	0700		USA, WJCR Upton KY	7490na	13595na		
0600	0700		USA, WRMI/R Miami Intl	7385na			
0600	0700		USA, WRNO New Orleans LA	7395na			
0600	0700		USA, WSHB Cypress Crk SC	13650af			
0600	0700		USA, WTJC Newport NC	9370na			
0600	0700		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0600	0700		USA, WYFR Okeechobee FL	5985na	7355eu		
0600	0700	vl	Vanuatu, Radio	4960do			
0600	0700		Yemen, Rep of Yemen Radio	9780me			
0600	0700		Zambia, Christian Voice	9865do			
0600	0610		Zambia, ZBC Radio 4	5975do			
0600	0700	vl	Zimbabwe, Zimbabwe BC	5975do			
0610	0615	mtwhf	Greece, Voice of	7475eu	11645mu	15630eu	9420na
0630	0700		Austria, Radio Austria Intl	6015na			
0630	0645		Finland, YLE/R Finland	15250va	21670va		
0630	0700	a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do	6080af	7295af
0630	0700	as	USA, Voice of America	5970af	6035af		
				11805af	12080af	15600af	
				11625af	13765af	15570af	
0630	0700		Vatican City, Vatican R	7105eu	9510eu	11775eu	15105eu
0641	0656		Romania, R. Romania Intl				
0645	0700		Germany, Deutsche Welle	6140eu			

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FREQUENCIES

0700	0800		Anguilla, Caribbean Beacon	6090am					0800	0900		Albania, Trans World R	9870eu	12070eu		
0700	0800	vl	Australia, ABC/Katherine	5025do					0800	0900		Anguilla, Caribbean Beacon	6090am			
0700	0800	vl	Australia, ABC/Tennant Creek	4910do					0800	0830	vl	Australia, ABC/Katherine	5025do			
0700	0800		Australia, Radio	9660as	12080as	15240as	15415as		0800	0830	vl	Australia, ABC/Tennant Creek	4910do			
				15515as	17580as	17750as	21725as		0800	0830		Australia, Radio	5995as	9710as	12080as	13605as
0700	0730		Belgium, R Vlaanderen Intl	5985am									15515as	21725as		
0700	0800	vl	Botswana, Radio	4820do	4830do	7255do			0800	0830	as	Australia, Radio	15415as	17750as		
0700	0800		Canada, CFRX Toronto	6070do					0800	0900	vl	Botswana, Radio	4820do	4830do	7255do	
0700	0800		Canada, CFVP Calgary	6030do					0800	0900	vl	Canada, CBC N Quebec Svc	9625do			
0700	0800		Canada, CHNX Halifax	6130do					0800	0900		Canada, CFRX Toronto	6070do			
0700	0800		Canada, CKZN St John's	6160do					0800	0900		Canada, CFVP Calgary	6030do			
0700	0800		Canada, CKZU Vancouver	6160do					0800	0900		Canada, CHNX Halifax	6130do			
0700	0800		Costa Rica, RF Peace Intl	6975va					0800	0900		Canada, CKZN St John's	6160do			
0700	0800		Ecuador, HCJB	15150eu	11755pa	21455va			0800	0900		Canada, CKZU Vancouver	6160do			
0700	0800		Eqt Guinea, Radio Africa	15186af					0800	0827		Costa Rica, RF Peace Intl	6975va			
0700	0800		Germany, Deutsche Welle	6140eu					0800	0900		Czech Rep, RF Prague Intl	11600eu	15255eu		
0700	0800	s	Germany, Good News World R	13740au					0800	0900		Ecuador, HCJB	15150eu	11755pa	21455va	
0700	0800		Germany, Voice of Hope	5975eu					0800	0900		Eqt Guinea, Radio Africa	15186af			
0700	0715	vl	Ghana, Ghana BC Corp	3366do	4915do				0800	0900	a	Finland, YLE/R Finland	9560eu			
0700	0800	vl	Italy, IRRS	7120va					0800	0900		Germany, Deutsche Welle	6140eu			
0700	0800	mtwhf	Kenya, Kenya BC Corp	4935do					0800	0900		Germany, Overcomer Ministries	13810au			
0700	0800		Kiribati, Radio	9810do					0800	0900	vl	Germany, Voice of Hope	5975eu			
0700	0800		Kuwait, Radio	15110as					0800	0900	as	Ghana, Ghana BC Corp	3366do	4915do		
0700	0800	vl	Lesotho, Radio	4800do					0800	0900		Guam, TWR/KTWR	15200as			
0700	0715		Liberia, LCN/R Liberia Intl	5100do					0800	0900		Guam, TWR/KTWR	15300au			
0700	0800	vl	Malawi, MBC	3380do	5995do				0800	0900	vl	Indonesia, Voice of	9525va			
0700	0800		Malaysia, Radio	7295do					0800	0815	vl	Italy, IRRS	7120va			
0700	0800		Malaysia, RTM Sarawak	7160do					0800	0900	mtwhf	Kenya, Kenya BC Corp	4935do			
0700	0800		Malaysia, Voice of	6175as	9750as	15295as			0800	0900		Kiribati, Radio	9810do			
0700	0800		New Zealand, R NZ Intl	17690va					0800	0900	vl	Lesotho, Radio	4800do			
0700	0800	vl	Nigeria, Radio/Enugu	6025do					0800	0900		Liberia, LCN/R Liberia Intl	5100do			
0700	0800	vl	Nigeria, Radio/Ibadan	6050do					0800	0810	vl	Malawi, MBC	3380do	5995do		
0700	0800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		0800	0900	vl	Malaysia, Radio	7295do			
0700	0800	vl	Nigeria, Radio/Lagos	3326do	4990do				0800	0825		Malaysia, Voice of	6175as	9750as	15295as	
0700	0800	vl	Nigeria, Voice of	7255af	15120va				0800	0830		Myanmar, Radio	9730do			
0700	0800		Palau, KHBN/Voice of Hope	9965as	9985as	15725as			0800	0900		N Marianas, KFBS Saipan	11650as	15380as		
0700	0730	vl	Papua New Guinea, NBC	9675do					0800	0900	vl	New Zealand, R NZ Intl	17690va			
0700	0800		Romania, R Romania Intl	17720af	21480af				0800	0900	vl	Nigeria, Radio/Enugu	6025do			
0700	0800		Russia, Voice of Russia WS	15460au	15470au	15525au	17570au		0800	0900	vl	Nigeria, Radio/Ibadan	6050do	6090do	7275do	9570do
				21790au					0800	0900	vl	Nigeria, Radio/Kaduna	4770do			
0700	0800		Sierra Leone, SLBS	3316do					0800	0900	vl	Nigeria, Radio/Lagos	3326do	4990do		
0700	0800		Singapore, Radio Corp Singapore	6150do					0800	0900	vl	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0700	0730		Slovakia, R Slovakia Intl	11990au	15460au	21705au			0800	0900	vl	Papua New Guinea, NBC	4890do			
0700	0800	vl	Solomon Islands, SIBC	5020do					0800	0900		Russia, Voice of Russia WS	15460au	15470au	15525au	17495au
0700	0735		Swaziland, Trans World R	4775af	6100af	9500af			0800	0900			17570au	21790au		
0700	0730		Switzerland, Swiss R Intl	9655eu					0800	0900		Sierra Leone, SLBS	5980do			
0700	0800		Taiwan, Radio Taiwan Intl	5950na					0800	0900		Singapore, Radio Corp Singapore	6150do			
0700	0715	as	UK, BBC World Service	17885af					0800	0900		South Korea, R Korea Intl	9570au	13670eu		
0700	0800		UK, BBC World Service	6005af	6175am	6190af	6195eu		0800	0900		UK, BBC World Service	6190af	9410eu	9580pa	9740as
				9410eu	9580pa	9740as	11760me						11940af	11955pa	15310as	
				11765af	11940af	11955pa	12095eu						15360as	15400af	15485eu	15565eu
				15310as	15400af	15485eu	15565eu		0800	0900	as	UK, BBC World Service	17640eu	17760as	17790as	17830af
				17640eu	17760as	17790as	17830af		0800	0900		USA, Armed Forces Network	21660as	21830as		
				21660as					0800	0900		USA, KAIJ Dallas TX	5835va			
0700	0800		USA, Armed Forces Network	4278am	6458am	12689am			0800	0900		USA, KNLS Anchor Point AK	11780as			
0700	0800		USA, KAIJ Dallas TX	5835va					0800	0900		USA, KTBN Salt Lake City UT	7510na			
0700	0800		USA, KTBN Salt Lake City UT	7510na					0800	0900		USA, KWHR Naalehu HI	11565as	17780as		
0700	0800		USA, KWHR Naalehu HI	11565as	17780as				0800	0900		USA, Voice of America	11995as	13650as	15150as	
0700	0730	a	USA, Voice of America	6873va					0800	0900		USA, WBCQ Monticello ME	7415na			
0700	0800		USA, WBCQ Monticello ME	7415na					0800	0900		USA, WEWN Birmingham AL	5825na			
0700	0800		USA, WEWN Birmingham AL	5825na					0800	0900		USA, WHRA Greenbush ME	7435af			
0700	0800		USA, WHRA Greenbush ME	7435af					0800	0900		USA, WHRI Noblesville IN	5745na	7315sa		
0700	0800		USA, WHRI Noblesville IN	5745na	7315sa				0800	0900		USA, WJCR Upton KY	7490na	13595na		
0700	0800		USA, WRMI Upton KY	7490na	13595na				0800	0900	thwfa	USA, WRMI/R Miami Intl	7385na			
0700	0800		USA, WRMI/R Miami Intl	7385na					0800	0900		USA, WRNO New Orleans LA	7395na			
0700	0800		USA, WRNO New Orleans LA	7395na					0800	0900		USA, WSHB Cypress Crk SC	9860eu	9845pa		
0700	0800		USA, WSHB Cypress Crk SC	13650af					0800	0900		USA, WTJC Newport NC	9370na			
0700	0800		USA, WTJC Newport NC	9370na					0800	0900	vl	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0700	0800		USA, WWCR Nashville TN	2390na	3210na	5070na	5935na		0800	0900		Vanuatu, Radio	4960do			
0700	0800		USA, WYFR Okeechobee FL	5850eu	7355eu	9985af			0800	0900	vl	Zambia, Christian Voice	9865do			
0700	0800	vl	Vanuatu, Radio	4960do					0800	0900		Zimbabwe, Zimbabwe BC	5975do			
0700	0720		Vatican City, Vatican R	4005eu	5883eu	7250eu			0804	0820		Pakistan, Radio	15530eu	17835eu		
0700	0800		Zambia, Christian Voice	9865do					0805	0810		Croatia, Croatian Radio	11880au	13820al		
0700	0800	vl	Zimbabwe, Zimbabwe BC	5975do					0810	0810	mtwhfa	Croatia, Croatian Radio	6165eu	7365eu	9830eu	
0705	0710		Croatia, Croatian Radio	11880au	13820al				0801	0815	s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0715	0800	as	UK, BBC World Service	15575as	17885af				0815	0900	as/vl	Italy, IRRS	7120va			
0725	0800		Myanmar, Radio	9730do					0815	0900	f	Seychelles, FEBA Radio	15460as			
0730	0800		Georgia, Georgian Radio	11910eu					0830	0900	vl	Australia, ABC/Alice Springs	2310do			
0730	0800	as	Guam, TWR/KTWR	15200as					0830	0900	vl	Australia, ABC/Katherine	2485do			
0730	0800	mtwhfa	Malta, V of Mediterranean	7155eu					0830	0900	vl	Australia, ABC/Tennant Creek	2325do			
0730	0800	vl	Papua New Guinea, NBC	4890do					0830	0900		Australia, Radio	5995as	9710as	12080as	13605as
0730	0800		Switzerland, Swiss R Intl	9885va	13635af	17665af							15415as	15515as	17750as	21725as
0730	0745	mtwhf	Vatican City, Vatican R	15595af					0830	0900	a	Austria, Radio Austria Intl	21650as	21765as		
0740	0750	a	Greece, Voice of	7475eu	9420na	11645au	15630eu		0830	0900	vl	Solomon Islands, SIBC	5020do			
0745	0800	as	Albania, Trans World R	9870eu	12070eu				0830	0900		Switzerland, Swiss R Intl	9885au	13685au		
0750	0800		Greece, Voice of	9775as					0830	0845	mtwhf	Vatican City, Vatican R	4005eu	5883eu	6185eu	7250eu
0755	0800	mtwhf	Albania, Trans World R	9870eu	12070eu								9645eu	11740eu		
									0845	0855	as	Monaco, Trans World Radio	9870eu			
									0855	0900	mtwhf	Monaco, Trans World Radio	9870eu			

FREQUENCIES

0900	0920	Albania, Trans World R	9870eu	12070eu			
0900	1000	Anguilla, Caribbean Beacon	6090am				
0900	1000	vi Australia, ABC/Alice Springs	2310do				
0900	1000	vi Australia, ABC/Katherine	2485do				
0900	1000	vi Australia, ABC/Tennant Creek	2325do				
0900	1000	Australia, Radio	11550as	11880as	13605as	17750as	
			21820as				
0900	1000	vi Botswana, Radio	4820do	4830do	7255do		
0900	1000	Canada, CFRX Toronto	6070do				
0900	1000	Canada, CFVP Calgary	6030do				
0900	1000	Canada, CHNX Halifax	6130do				
0900	1000	Canada, CKZN St John's	6160do				
0900	1000	Canada, CKZU Vancouver	6160do				
0900	0956	China, China Radio Intl	11730pa	15210pa			
0900	1000	Costa Rica, RF Peace Intl	6975va				
0900	1000	Ecuador, HCJB	11775pa	21455va			
0900	1000	Eqt Guinea, Radio Africa	15186af				
0900	0945	Germany, Deutsche Welle	6160pa	11785af	12055as	15105as	
			15410af	17800af	17820as	17860af	
			5995eu				
0900	1000	a Germany, Good News World R	13800va				
0900	1000	s Germany, Good News World R	5975eu				
0900	1000	Ghana, Voice of Hope	4915do	6130do			
0900	0915	as Ghana, Ghana BC Corp	15200as				
0900	0915	Guam, TWR/KTWR	15300au				
0900	0930	Guam, TWR/KTWR	7120va				
0900	1000	as/vl Italy, IRRS	4915do				
0900	1000	mtwhf Kenya, Kenya BC Corp	4935do				
0900	1000	mtwhf Kenya, Kenya BC Corp	9810do				
0900	0930	Kiribati, Radio	4800do				
0900	1000	vi Lesotho, Radio	5100do				
0900	0915	Liberia, LCN/R Liberia Int	7295do				
0900	1000	Malaysia, Radio	5980do				
0900	1000	vi Malaysia, RTM Kota Kinabalu	9870eu				
0900	1000	mtwhf Monaco, Trans World Radio	9495as	11650as	15380as		
0900	1000	N Marianas, KFBS Saipan	11725as				
0900	1000	N Marianas, KHBI Saipan	17690va				
0900	1000	New Zealand, R NZ Intl	6025do				
0900	1000	vi Nigeria, Radio/Enugu	6050do				
0900	1000	vi Nigeria, Radio/Ibadan	4770do	6090do	7275do	9570do	
0900	1000	vi Nigeria, Radio/Kaduna	3326do	4990do			
0900	1000	vi Nigeria, Radio/Lagos	9955as	9965as	9985as	15725as	
0900	1000	Palau, KHBN/Voice of Hope	4890do				
0900	1000	vi Papua New Guinea, NBC	9905au	15460au	15470au	17495au	
0900	1000	Russia, Voice of Russia WS	21740au				
			5980do				
0900	1000	Sierra Leone, SLBS	6150do				
0900	1000	Singapore, Radio Corp Singapore	5020do				
0900	1000	vi Solomon Islands, SIBC	6190af	6195va	7245as	9740as	
0900	1000	UK, BBC World Service	11760me	11765as	11940af	11945as	
			11955pa	12095eu	15190sa	15310as	
			15360as	15400af	15485eu	15565eu	
			15575as	17640eu	17760as	17790as	
			17830af	17885af	21470af	21660as	
0900	1000	USA, Armed Forces Network	4278am	6458am	12689am		
0900	1000	USA, KAIJ Dallas TX	5835va				
0900	1000	USA, KTBN Salt Lake City UT	7510na				
0900	1000	USA, KWHR Naalehu HI	11565as	17780as			
0900	1000	USA, Voice of America	11995as	13650as	15150as		
0900	1000	USA, WBCQ Monticello ME	7415na				
0900	1000	USA, WEWN Birmingham AL	5825na				
0900	1000	USA, WHRA Greenbush ME	7435af				
0900	1000	USA, WHRI Noblesville IN	5745na	7315na			
0900	1000	USA, WJCR Upton KY	7490na	13595na			
0900	1000	USA, WRMI/R Miami Intl	7385na				
0900	1000	USA, WRNO New Orleans LA	7395na				
0900	1000	USA, WSHB Cypress Crk SC	9455sa	9860eu	11840as		
0900	1000	USA, WTJC Newport NC	9370na				
0900	1000	USA, WWCN Nashville TN	2390na	3210na	5070na	5935na	
0900	1000	Zambia, Christian Voice	9865do				
0900	1000	vi Zimbabwe, Zimbabwe BC	5975do				
0905	0910	Croatia, Croatian Radio	13820au				
0905	0910	s Croatia, Croatian Radio	6165eu	7185eu	7365eu	9830eu	
0920	0950	s Albania, Trans World R	9870eu	12070eu			
0920	0950	as UK, BBC World Service	6195as	9740as	11955pa	15360as	
			17760as	21660as			
			21650as	21765au			
0930	1000	Austria, Radio Austria Intl	11910eu				
0930	1000	Georgia, Georgian Radio	7230eu				
0930	1000	Italy, AWR Europe	7260as	9790as	12065as		
0930	1000	Netherlands, Radio	15240eu				
0940	1000	s Armenia, Voice of	6140eu				
0945	1000	Germany, Deutsche Welle	11140as				
0953	1000	Australia, Defense Forces Radio					

1000	1100	Anguilla, Caribbean Beacon	11775am				
1000	1100	vi Australia, ABC/Alice Springs	2310do				
1000	1100	vi Australia, ABC/Katherine	2485do				
1000	1100	vi Australia, ABC/Tennant Creek	2325do				
1000	1100	Australia, Radio	11880as	13605as	17750as	21820as	
1000	1100	as Bhutan, Bhutan BC Service	6035do				
1000	1100	vi Botswana, Radio	4820do	4830do	7255do		
1000	1100	vi Canada, CBC N Quebec Svc	9625do				
1000	1100	Canada, CFRX Toronto	6070do				
1000	1100	Canada, CFVP Calgary	6030do				
1000	1100	Canada, CHNX Halifax	6130do				
1000	1100	Canada, CKZN St John's	6160do				
1000	1100	Canada, CKZU Vancouver	6160do				
1000	1056	China, China Radio Intl	11730pa	15210pa			
1000	1100	Costa Rica, RF Peace Intl	6975va				
1000	1010	Croatia, Croatian Radio	13820au				
1000	1029	Czech Rep, R Prague Intl	17485af	21745va			
1000	1100	Ecuador, HCJB	11755pa	21455va			
1000	1100	Eqt Guinea, Radio Africa	15186af				
1000	1100	Germany, Deutsche Welle	6140eu				
1000	1100	Germany, Voice of Hope	5975eu				
1000	1100	India, All India Radio	11585as	13700as	15020as	17840as	
			17845au	17895au			
			7120va				
1000	1100	as/vl Italy, IRRS	9695as	11850pa	15590as		
1000	1100	Japan, Radio/NHK	17680eu				
1000	1100	Jordan, Radio	4915do				
1000	1100	mtwhf Kenya, Kenya BC Corp	4935do				
1000	1100	mtwhf Kenya, Kenya BC Corp	4800do				
1000	1100	vi Lesotho, Radio	7295do				
1000	1100	Malaysia, Radio	5980do				
1000	1100	vi Malaysia, RTM Kota Kinabalu	11770eu				
1000	1100	s Malta, V of Mediterranean	9870eu				
1000	1020	mtwhf Monaco, Trans World Radio	9495as	11650as	15380as		
1000	1100	N Marianas, KFBS Saipan	11840as				
1000	1100	N Marianas, KHBI Saipan	7260as	9790as	12065as		
1000	1100	Netherlands, Radio	17690va				
1000	1100	New Zealand, R NZ Intl	6025do				
1000	1100	vi Nigeria, Radio/Enugu	6050do				
1000	1100	vi Nigeria, Radio/Ibadan	4770do	6090do	7275do	9570do	
1000	1100	vi Nigeria, Radio/Kaduna	4990do				
1000	1100	vi Nigeria, Radio/Lagos	7255af	15120va			
1000	1100	vi Nigeria, Voice of	9955as	9965as	9985as	15725as	
1000	1100	Palau, KHBN/Voice of Hope	4890do				
1000	1100	vi Papua New Guinea, NBC	9905au	15460au	15470au	17495au	
1000	1100	Russia, Voice of Russia WS	5980do				
1000	1100	Sierra Leone, SLBS	6150do				
1000	1100	Singapore, Radio Corp Singapore	11740as				
1000	1030	Singapore, RTE Radio	5020do				
1000	1100	vi Solomon Islands, SIBC	6190af	6195va	9740as	11760me	
1000	1100	UK, BBC World Service	11940af	11955pa	12095eu	15310as	
			15360as	15485eu	15565eu	15575as	
			17640eu	17760as	17790as	17885af	
			21470af	21660as			
1000	1100	as UK, BBC World Service	15190sa	15400af	17830af		
1000	1100	USA, Armed Forces Network	4278am	6458am	12689am		
1000	1100	USA, KAIJ Dallas TX	5835va				
1000	1100	USA, KTBN Salt Lake City UT	7510na				
1000	1100	USA, KWHR Naalehu HI	9930as	11565as			
1000	1100	USA, Voice of America	5985pa	6165am	7370am	9590am	
			11720as	15250as	15425as		
			7415na				
1000	1100	USA, WBCQ Monticello ME	5825na	7465eu			
1000	1100	USA, WEWN Birmingham AL	6040na	9495am			
1000	1100	USA, WHRI Noblesville IN	7490na	13595na			
1000	1100	USA, WJCR Upton KY	7385na				
1000	1100	USA, WRMI/R Miami Intl	7395na				
1000	1100	USA, WRNO New Orleans LA	6095am	9455sa			
1000	1100	USA, WSHB Cypress Crk SC	9370na				
1000	1100	USA, WTJC Newport NC	2390na	3210na	5070na	5935na	
1000	1100	USA, WWCN Nashville TN	5950na				
1000	1027	USA, WYFR Okeechobee FL	9840as	12020as			
1000	1100	Vietnam, Voice of	9865do				
1000	1100	Zambia, Christian Voice	5975do				
1000	1100	vi Zimbabwe, Zimbabwe BC	11140as				
1006	1058	Australia, Defense Forces Radio	4010do	4050do			
1020	1030	t Kyrgyzstan, Kyrgyz Radio	9870eu				
1020	1050	s Monaco, Trans World Radio	5990do	7110do	9705do		
1030	1100	mtwhf Ethiopia, Radio	11910me				
1030	1100	Georgia, Georgian Radio	11660as	11795as			
1030	1100	Guam, AWR/KSDA	15640va	17535va			
1030	1035	Israel, Kol Israel	9710eu				
1030	1100	Lithuania, Radio Vilnius	7160do				
1030	1100	Malaysia, RTM Sarawak	13675eu	15370eu	15395eu	21605eu	
1030	1100	UAE, Radio Dubai					



FREQUENCIES

1100 1200	Anguilla, Caribbean Beacon	11775am				1100 1200	Singapore, R Singapore Int	6150as	9590as
1100 1200 vl	Australia, ABC/Alice Springs	2310do				1100 1130 vl	Solomon Islands, SIBC	5020do	
1100 1200 vl	Australia, ABC/Katherine	2485do				1100 1200	Switzerland, Swiss R Intl	9540as	21770as
1100 1200 vl	Australia, ABC/Tennant Creek	2325do				1100 1200	Taiwan, Voice of Asia	7445as	
1100 1200	Australia, Radio	5995as	6020as	9580as	12080as	1100 1130 mthwhf	UK, BBC Caribbean Report	6195am	15220am
		13605as	21820as			1100 1130 as	UK, BBC World Service	6195na	15190sa
		15700eu	4830do	7255do		1100 1200	UK, BBC World Service	5965na	6190af
1100 1200 vl	Botswana, Radio	4820do						9740as	11760me
1100 1200	Bulgaria, Radio	15700eu						12095eu	15280as
1100 1200	Canada, CFRX Toronto	6070do						15485eu	15565eu
1100 1200	Canada, CFVP Calgary	6030do						17705as	17790sa
1100 1200	Canada, CHNX Halifax	6130do						21470af	
1100 1200	Canada, CKZN St John's	6160do				1100 1200	USA, Arme Forces Network	4278am	6458am
1100 1200	Canada, CKZU Vancouver	6160do				1100 1200	USA, KALI Dallas TX	5835va	
1100 1200	Costa Rica, RF Peace Intl	6975va				1100 1200	USA, KTVN Salt Lake City UT	7510na	
1100 1200	Ecuador, HCJB	12005am	15115am	21455va		1100 1200	USA, KWHR Naalehu HI	9930as	11565as
1100 1200	Eqt Guinea, Radio Africa	15186af				1100 1130 mthwhf	USA, Voice of America	13675af	15510af
1100 1145	Germany, Deutsche Welle	6140eu	15410af	17800af	21780af			21705af	
1100 1200	Germany, Overcomer Ministries	5850eu				1100 1200	USA, Voice of America	5985pa	6110as
1100 1200 as	Ghana, Ghana BC Corp	4915do	6130do					11705as	9645as
1100 1200	Iran, VOIRI	13710as	15255pa	15430me	17565as			11705as	11720as
		21470as	21510as			1100 1200	USA, WEWN Birmingham AL	5825na	15745eu
1100 1200 as/vl	Italy, IRRS	7120va				1100 1200	USA, WHRI Noblesville IN	6040na	9495am
1100 1200	Japan, Radio/NHK	6120na	9695as	15590as		1100 1200	USA, WJCR Upton KY	7490na	13595na
1100 1200	Jordan, Radio	17680eu				1100 1200	USA, WRNO New Orleans LA	7395na	
1100 1200 mthwhf	Kenya, Kenya BC Corp	4915do				1100 1200	USA, WSHB Cypress Crk SC	6095am	11660sa
1100 1200 mthwhf	Kenya, Kenya BC Corp	4935do				1100 1200	USA, WTJC Newport NC	9370na	
1100 1200 vl	Lesotho, Radio	4800do				1100 1200	USA, WWCR Nashville TN	2390na	5070na
1100 1110	Liberia, LCN/R Liberia Int	5100do				1100 1200	USA, WYFR Okeechobee FL	5950na	5935na
1100 1200	Malaysia, Radio	7295do				1100 1127	Vietnam, Voice of	7285as	11830na
1100 1200 vl	Malaysia, RTM Kota Kinabalu	5980do				1100 1200	Zambia, Christian Voice	9865do	
1100 1200	N Marianas, KFBS Saipan	9495as	11650as	15380as		1100 1200 vl	Zimbabwe, Zimbabwe BC	5975do	
1100 1125	Netherlands, Radio	7260as	9790as	12065as		1104 1120	Pakistan, Radio	15530eu	17835eu
1100 1200 occsnal	New Zealand, R NZ Intl	6105va				1115 1145	Nepal, Radio	3230as	5005as
1100 1200	New Zealand, R NZ Intl	17690va				1130 1200	Belgium, R Vlaanderen Intl	9925eu	9865va
1100 1200 vl	Nigeria, Radio/Enugu	6025do				1130 1200 vl	China, China Radio Intl	8660as	11700as
1100 1200 vl	Nigeria, Radio/Ibadan	6050do				1130 1157	Czech Rep, R Prague Intl	11640eu	21745af
1100 1200 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	1130 1200 vl	Libya, Voice of Africa	15235va	15415va
1100 1200 vl	Nigeria, Radio/Lagos	4990do				1130 1200	Netherlands, Radio	6045eu	9855eu
1100 1200 vl	Nigeria, Voice of	7255af	15120va			1130 1200	South Korea, R Korea Intl	9650na	
1100 1104	Pakistan, Radio	7110do	11835do	15530do	17835eu	1130 1200 as	UK, BBC World Service	15310as	17705as
		21460eu				1130 1200	UK, Merlin Network One	17650au	
1100 1200	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as	1130 1200 f	Vatican City, Vatican R	15595af	17515af
1100 1200 vl	Papua New Guinea, NBC	4890do				1130 1140	Zambia, ZBC Radio 4	5975do	
1100 1200	Sierra Leone, SLBS	5980do				1145 1200	Germany, Deutsche Welle	6140eu	

SELECTED PROGRAMS

Sundays

- 1100 Netherlands, Radio: Aural Tapestry. See S 0000.
 1100 USA, KTVN Salt Lk City UT: Breakthrough. Rod Parsley conducts services from the World Harvest Church in Columbus, OH.
 1110 Bulgaria, Radio, Radio: News Behind the News. See S 0210.
 1125 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.
 1130 Netherlands, Radio: Dutch Horizons. Bertine Krol covers a wide variety of topics.
 1154 Netherlands, Radio: News. See S 0050.

Monday-Friday

- 1100 Bulgaria, Radio, Radio: News. See S 0200.
 1130 Netherlands, Radio: News. See S 0050.

Mondays

- 1100 USA, KTVN Salt Lk City UT: TotalFit. Lee Haney.
 1108 Netherlands, Radio: EuroQuest. Jonathan Groubert hosts the program of background stories, current affairs, social trends, the arts and more. RN allows this program to be rebroadcast around the world.
 1115 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 1130 Bulgaria, Radio, Radio: Plaza Bulgaria (biweekly). See S 2325.
 1130 Bulgaria, Radio, Radio: Spectrum (biweekly). Thirty-minute digest on a wide variety of topics.
 1130 USA, KTVN Salt Lk City UT: Candi Staton Sussewell. See S 0600.
 1138 Netherlands, Radio: Research File. The new Science Team presents science and medical specials throughout the year.

Tuesdays

- 1100 USA, KTVN Salt Lk City UT: Dean and Mary. Dean and Mary Brown with music that ministers.

- 1108 Netherlands, Radio: A Good Life. Ginger da Silva looks at global issues such as the impact of information technology, the worldwide web, and other development issues.
 1110 Bulgaria, Radio, Radio: Events and Development. A review of upcoming events this week.
 1125 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 1130 USA, KTVN Salt Lk City UT: Reasons to Believe. Astronomer/minister Hugh Ross provides scientific, historical and philosophical evidence for religious skeptics.
 1138 Netherlands, Radio: Music 52-15. Martha Hawley hosts this program of rarely heard international music.
 1145 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.

Wednesdays

- 1100 USA, KTVN Salt Lk City UT: Jubilee TV. See W 0630.
 1108 Netherlands, Radio: Dutch Horizons. See S 1130.
 1110 Bulgaria, Radio, Radio: Events and Development. See T 1110.
 1125 Bulgaria, Radio, Radio: Art and Artists. See T 2325.
 1130 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 1130 USA, KTVN Salt Lk City UT: Back on Course. Patti and Gavin MacLeod talk about marriage.
 1138 Netherlands, Radio: Documentary. An in-depth treatment of one subject or a short series.
 1141 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.

Thursdays

- 1100 USA, KTVN Salt Lk City UT: Good News Today! T.L. Osborn evangelizes.
 1108 Netherlands, Radio: Research File. See M 1138.
 1110 Bulgaria, Radio, Radio: Events and Development. See T 1110.
 1125 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.

- 1130 USA, KTVN Salt Lk City UT: The Laverne Tripp Family. Country Christian music performed by Laverne and Edith Tripp and their kin.
 1138 Netherlands, Radio: Media Network. Jonathan Marks and Diana Janssen look at the world of broadcasting. Top-rated.
 1145 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.

Fridays

- 1100 USA, KTVN Salt Lk City UT: TotalFit. See M 1100.
 1108 Netherlands, Radio: Documentary. See W 1138.
 1110 Bulgaria, Radio, Radio: Events and Development. See T 1110.
 1125 Bulgaria, Radio, Radio: The Way We Live. See H 2325.
 1130 USA, KTVN Salt Lk City UT: Battlegrounds. Colby May.
 1138 Netherlands, Radio: A Good Life. See T 1108.

Saturdays

- 1100 Bulgaria, Radio, Radio: News. See S 0200.
 1100 USA, KTVN Salt Lk City UT: Superbook. Animated stories from the bible for children.
 1108 Netherlands, Radio: Roughly Speaking. See S 0030.
 1110 Bulgaria, Radio, Radio: Events and Development. See T 1110.
 1125 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.
 1130 Netherlands, Radio: Aural Tapestry. See S 0000.
 1130 USA, KTVN Salt Lk City UT: Colby's Clubhouse. A program by kids and for kids.
 1135 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 1145 Bulgaria, Radio, Radio: Radio Bulgaria Calling. See S 0245.
 1154 Netherlands, Radio: News. See S 0050.

1200	1256		North Korea, R Pyonyang	3560af	9640va	9850va	9975af
1200	1300			11335va	13650va		
1200	1300	m-a/vl	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
1200	1300		Papua New Guinea, NBC	4890do			
1200	1300		Sierra Leone, SLBS	5980do			
1200	1300		Singapore, R Singapore Int	6150as	9590as		
1200	1230		Switzerland, Swiss R Intl	9535eu			
1200	1300		Taiwan, Radio Taiwan Intl	7130as	9610au		
1200	1300		UK, BBC World Service	5965na	6190af	6195va	9515na
				9580as	9740as	11760me	11940af
				11955as	12095eu	15220am	15280as
				15310as	15485af	15565eu	15575as
				17640eu	17830af	17885af	21470af
1200	1300		USA, Armed Forces Network	4278am	6458am	12689am	
1200	1300		USA, KALJ Dallas TX	5835va			
1200	1300		USA, KLTN Salt Lake City UT	7510na			
1200	1300		USA, KWHR Naalehu HI	9930as	11565as		
1200	1300		USA, Voice of America	6110as	9645as	9760as	9780as
				11705as	11715as	15425as	
1200	1300		USA, WEWN Birmingham AL	5825na	15745eu		
1200	1300		USA, WHRI Noblesville IN	6040na	9495am		
1200	1300		USA, WJCR Upton KY	7490na	13595na		
1200	1300		USA, WRNO New Orleans LA	7395na			
1200	1300		USA, WSHB Cypress Crk SC	6095am	11660ca	11550as	
1200	1300		USA, WTJC Newport NC	9370na			
1200	1300		USA, WWCR Nashville TN	5070na	5935na	7435na	12160na
1200	1300		USA, WYFR Okeechobee FL	5950na	7355na	11830na	11970na
1200	1300		Zambia, Christian Voice	9865do			
1200	1300	vl	Zimbabwe, Zimbabwe BC	5975do			
1204	1216	mtwhf as	UK, BBC Caribbean Report	6195am	15220am		
1204	1216		UK, BBC World Service	6195na	15220am		
1215	1300		Egypt, Radio Cairo	17595as			
1220	1300	mtwhf	Vatican City, Vatican R	5883va	9645va	11740va	15595va
1230	1300		Bangladesh, Bangla Betar	7185as	9548as		
1230	1257		Czech Rep, R Prague Intl	6055eu	21745au		
1230	1300		Germany, AWR Europe	7230va			
1230	1300		Guam, AWR/KSDA	15225as			
1230	1300		Italy, AWR Europe	7230eu			
1230	1300		South Korea, R Korea Intl	9570as	9640om		
1230	1300		Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as
				15425as			
1230	1300		Sweden, Radio	18960na	21810am		
1230	1300		Thailand, Radio	9655as	9810as	11905as	
1230	1300		Turkey, Voice of	17830as	21540eu		
1230	1257		Vietnam, Voice of	9840as	12020as		

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FREQUENCIES

1300 1400	Anguilla, Caribbean Beacon	11775am				1300 1400	Sierra Leone, SLBS	5980do			
1300 1400 vl	Australia, ABC/Alice Springs	2310do				1300 1400	Singapore, R Singapore Int	6150as	9590as		
1300 1400 vl	Australia, ABC/Katherine	2485do				1300 1400	South Korea, R Korea Intl	9570as	9640om	13670as	
1300 1400 vl	Australia, ABC/Tennant Creek	2325do				1300 1400	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as
1300 1400	Australia, Radio	5995as	6020as	9445as	9580as			15425as			
		11650as	11660as	21820as		1300 1330	Turkey, Voice of	17830as	21540eu		
		4820do	4830do	7255do		1300 1400	Uganda, Radio	4976do			
1300 1400 vl	Botswana, Radio	15445am				1300 1400	UK, BBC World Service	5965na	5990as	6190af	6195va
1300 1320	Brazil, Radio Nacional Bras	9625do						9515na	9590na	9740as	11760me
1300 1400 vl	Canada, CBC N Quebec Svc	6070do						11940af	12095eu	15220am	15310as
1300 1400	Canada, CFRX Toronto	6030do						15420af	15485eu	15565eu	15575as
1300 1400	Canada, CFVP Calgary	6130do						17640eu	17705as	17830af	17885af
1300 1400	Canada, CHNX Halifax	6160do						21470af			
1300 1400	Canada, CKZN St John's	6160do									
1300 1400	Canada, CKZU Vancouver	6160do				1300 1400	Ukraine, Radio Ukraine Intl	9870na	15520na	21510na	
1300 1330	Canada, Radio Canada Intl	9640na	13650na	17710na		1300 1400	USA, Armed Forces Network	4278am	6458am	12689am	
1300 1356	China, China Radio Intl	9570na	11675pa	11900pa	11980as	1300 1400	USA, KAIJ Dallas TX	5835va			
		15180as				1300 1400	USA, KJES Vado NM	11715na			
1300 1400	Costa Rica, RF Peace Intl	25930va				1300 1400	USA, KNLS Anchor Point AK	9615as			
1300 1400	Ecuador, HCJB	12005am	15115am	21455va		1300 1400	USA, KTBN Salt Lake City UT	7510na			
1300 1330	Egypt, Radio Cairo	17595as				1300 1400	USA, KWHR Naalehu HI	9930as	11565as		
1300 1400	Eq Guinea, Radio Africa	15186af				1300 1400	USA, Voice of America	6110as	9355as	9645as	9760as
1300 1400	France, Radio France Intl	15155eu	15195eu					11705as	11715as	15425as	21665as
1300 1329	Germany, Deutsche Welle	6140eu				1300 1400	mtwhf USA, WBCQ Monticello ME	9340na			
1300 1400 a	Germany, Good News World R	15330as				1300 1400	USA, WEWN Birmingham AL	11875na	15745eu		
1300 1400	Germany, Overcomer Ministries	5850eu				1300 1400	mtwhf USA, WGTG McCaysville GA	9400va	12172am		
1300 1330 s	Germany, Universal Life	9955na				1300 1400	USA, WHRI Noblesville IN	6040na	15105am		
1300 1400	Ghana, Ghana BC Corp	4915do	6130do			1300 1400	USA, WJCR Upton KY	7490na	13595na		
1300 1400	Jordan, Radio	11690eu				1300 1315	smtwhf USA, WRMI/R Miami Intl	9955am			
1300 1320	Kazakhstan, R Almaty	9620eu	11840eu			1300 1400	USA, WRNO New Orleans LA	7395na			
1300 1400	Kenya, Kenya BC Corp	4915do				1300 1400	USA, WSHB Cypress Crk SC	9430na	9455ca	9940as	
1300 1400	Kenya, Kenya BC Corp	4935do				1300 1400	USA, WTJC Newport NC	9370na			
1300 1315 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1300 1400	USA, WWCR Nashville TN	5070na	5935na	7435na	15685na
1300 1400	Lebanon, Voice of Hope	11530va				1300 1400	USA, WYFR Okeechobee FL	11550as	11740na	11830na	11970na
1300 1400 vl	Lesotho, Radio	4800do						13695na			
1300 1310	Liberia, LCN/R Liberia Intl	5100do				1300 1400	Zambia, Christian Voice	9865do			
1300 1400	Malaysia, Radio	7295do				1300 1400 vl	Zimbabwe, Zimbabwe BC	5975do			
1300 1400 vl	Malaysia, RTM Kota Kinabalu	5980do				1315 1345	Albania, R Tirana Intl	7130eu	9540eu		
1300 1325	Moldova, R Moldova Intl	11580am				1315 1400	Germany, Voice of Hope	15715as			
1300 1400	N Marianas, KFBS Saipan	9670as	11650as			1315 1400 s	USA, WRMI/R Miami Intl	9955am			
1300 1400	N Marianas, KHBI Saipan	11550as				1325 1340 f	Greece, Voice of	15630as			
1300 1325	Netherlands, Radio	6045eu	9855eu			1330 1400	Austria, Radio Austria Intl	6155eu	13730am		
1300 1400	occsnal New Zealand, R NZ Intl	6105va				1330 1400	Canada, Radio Canada Intl	6150as	9535as	9640na	13650na
1300 1400 vl	Nigeria, Radio	6050do						17710na			
1300 1400 vl	Nigeria, Radio/Enugu	6025do				1330 1400	Guam, AWR/KSDA	11755as	15225as		
1300 1400 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	1330 1400	India, All India Radio	9545as	11620as	13710as	
1300 1400 vl	Nigeria, Radio/Lagos	4990do	7285do			1330 1400	Sweden, Radio	17505as	17870as		
1300 1400	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as	1330 1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1300 1400 vl	Papua New Guinea, NBC	4890do				1330 1357	Vietnam, Voice of	7145eu	9730eu		
1300 1356	Romania, R Romania Intl	11940eu	15335na	15390eu	17805na	1340 1400 t	Kazakhstan, R Almaty	9620eu	11840eu		
1300 1400 as	S Africa, Channel Africa	21725af				1345 1400	Vatican City, Vatican R	15510au	17515au		

SELECTED PROGRAMS

Daily

- 1300 USA, VOA Washington DC (News Now): VOA News Now Preview.
 1301 USA, VOA Washington DC (News Now): World News.
 1306 USA, VOA Washington DC (News Now): World News in Depth.
 1310 USA, VOA Washington DC (News Now): Regional News.
 1314 USA, VOA Washington DC (News Now): USA News.
 1318 USA, VOA Washington DC (News Now): Sports.
 1322 USA, VOA Washington DC (News Now): Features.
 1328 USA, VOA Washington DC (News Now): Station Break.
 1330 USA, VOA Washington DC (News Now): Preview.
 1331 USA, VOA Washington DC (News Now): World News.
 1358 USA, VOA Washington DC (News Now): Station Break.

Sundays

- 1300 USA, KTBN Salt Lk City UT: Spiritual Protocol. Pastor Earl Paulk preaches from Atlanta.
 1333 USA, VOA Washington DC (News Now): Issues in the News.

Mondays

- 1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
 1330 USA, KTBN Salt Lk City UT: John Hagee Today. Evangelizing by John Hagee of the Cornerstone Church in San Antonio, TX.
 1336 USA, VOA Washington DC (News Now): Dateline.
 1345 USA, VOA Washington DC (News Now): Science/Medicine/Environment.
 1349 USA, VOA Washington DC (News Now): Business and Economic News.

- 1353 USA, VOA Washington DC (News Now): Women's Business Minute.
 1354 USA, VOA Washington DC (News Now): Feature.

Tuesdays

- 1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
 1330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
 1336 USA, VOA Washington DC (News Now): Dateline.
 1345 USA, VOA Washington DC (News Now): Science/Medicine/Environment.
 1349 USA, VOA Washington DC (News Now): Business and Economic News.
 1353 USA, VOA Washington DC (News Now): Women's Business Minute.
 1354 USA, VOA Washington DC (News Now): Feature.

Wednesdays

- 1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
 1330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
 1336 USA, VOA Washington DC (News Now): Dateline.
 1345 USA, VOA Washington DC (News Now): Science/Medicine/Environment.
 1349 USA, VOA Washington DC (News Now): Business and Economic News.
 1353 USA, VOA Washington DC (News Now): Women's Business Minute.
 1354 USA, VOA Washington DC (News Now): Feature.

Thursdays

- 1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
 330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
 1336 USA, VOA Washington DC (News Now): Dateline.

- 1345 USA, VOA Washington DC (News Now): Science/Medicine/Environment.
 1349 USA, VOA Washington DC (News Now): Business and Economic News.
 1353 USA, VOA Washington DC (News Now): Women's Business Minute.
 1354 USA, VOA Washington DC (News Now): Feature.

Fridays

- 1300 USA, KTBN Salt Lk City UT: Changing Your World. See M 0130.
 1330 USA, KTBN Salt Lk City UT: John Hagee Today. See M 1330.
 1336 USA, VOA Washington DC (News Now): Dateline.
 1345 USA, VOA Washington DC (News Now): Science/Medicine/Environment.
 1349 USA, VOA Washington DC (News Now): Business and Economic News.
 1353 USA, VOA Washington DC (News Now): Women's Business Minute.
 1354 USA, VOA Washington DC (News Now): Feature.

Saturdays

- 1300 USA, KTBN Salt Lk City UT: Joy Junction. Fun and games for children from the Christian Television Network (CTN).
 1330 USA, KTBN Salt Lk City UT: Quigley's Village. Mr. Quigley and his puppet friends offer wholesome entertainment for children.
 1332 USA, VOA Washington DC (News Now): Communications World.

FREQUENCIES

1400 1500	Anguilla, Caribbean Beacon	11775am				1400 1500	Singapore, Radio Corp Singapore	6150do			
1400 1500 vl	Australia, ABC/Alice Springs	2310do				1400 1500	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as
1400 1500 vl	Australia, ABC/Katherine	2485do						15425as			
1400 1500 vl	Australia, ABC/Tennant Creek	2325do				1400 1430	Switzerland, Swiss R Intl	9535eu			
1400 1500	Australia, Radio	5995as	6180as	9445as	9550as	1400 1500	Switzerland, Swiss R Intl	12010as	15185as		
		9580as	11650as	11660as		1400 1500	Taiwan, Radio Taiwan Intl	15125as			
1400 1500 vl	Botswana, Radio	4820do	4830do	7255do		1400 1430	Thailand, Radio	9530as	9655as	11905as	
1400 1500 vl	Canada, CBC N Quebec Svc	9625do				1400 1500	Uganda, Radio	4976do			
1400 1500	Canada, CFRX Toronto	6070do				1400 1500	UK, BBC World Service	5990as	6190af	6195as	9515na
1400 1500	Canada, CFVP Calgary	6030do						9590na	9740as	11940af	12095eu
1400 1500	Canada, CHNX Halifax	6130do						15220na	15310as	15485eu	15565eu
1400 1500	Canada, CKZN St John's	6160do						15575as	17630as	17640eu	17830af
1400 1500	Canada, CKZU Vancouver	6160do						17840am	21470af	21660af	
1400 1430 mtwhf	Canada, Radio Canada Intl	13650na				1400 1500 a	UK, Merlin Network One	9605eu	13640eu	15510eu	
1400 1500 smtwhf	Canada, Radio Canada Intl	9640na	17710na			1400 1500	USA, Armed Forces Network	4278am	6458am	12689am	
1400 1456	China, China Radio Intl	7405as	9700as	11675as	11825as	1400 1500	USA, KAJI Dallas TX	13815va			
		13685af	15110as	15125af	15360af	1400 1500	USA, KJES Vado NM	11715na			
1400 1500	Costa Rica, RF Peace Intl	25930va				1400 1500	USA, KTVN Salt Lake City UT	7510na			
1400 1429	Czech Rep, R Prague Intl	21745va				1400 1500	USA, KWHR Naalehu HI	9930as	11565as		
1400 1500	Ecuador, HCJB	12005am	15115am	21455va		1400 1500 s	USA, Voice of America	18275va			
1400 1500	Egt Guinea, Radio Africa	15186af						6110as	7125as	7215as	9645as
1400 1500	France, Radio France Intl	11610as	17620va	17680as				9760as	11705as	15205as	15395as
1400 1500	Germany, Overcomer Ministries	5850eu	13810eu					15425as	21840as		
1400 1500	Germany, RTE Radio	15625eu				1400 1500 mtwhf	USA, WBCQ Monticello ME	9340na			
1400 1430 s	Germany, Universal Life	9710eu				1400 1500	USA, WEWN Birmingham AL	11875na	15745eu		
1400 1500	Germany, Voice of Hope	15715as				1400 1500 mtwhf	USA, WGTG McCaysville GA	9400va	12172am		
1400 1500	Ghana, Ghana BC Corp	4915do	6130do			1400 1500	USA, WHRI Noblesville IN	6040na	15105am		
1400 1500	India, All India Radio	9545as	11620as	13710as		1400 1500	USA, WJCR Upton KY	7490na	13595na		
1400 1430	Israel, Kal Israel	15650va				1400 1500 irreg	USA, WMLK Bethel PA	9465am			
1400 1500	Japan, Radio/NHK	9505na	11730as	11880me		1400 1500 s	USA, WRMI/R Miami Intl	9955am			
1400 1500	Jordan, Radio	11690eu				1400 1500	USA, WRNO New Orleans LA	7395na			
1400 1500 mtwhf	Kenya, Kenya BC Corp	4915do				1400 1500	USA, WTJC Newport NC	9370na			
1400 1500 mtwhf	Kenya, Kenya BC Corp	4935do				1400 1500	USA, WWCN Nashville TN	9475na	12160na	13845na	15685na
1400 1500	Lebanon, Voice of Hope	11530va				1400 1500	USA, WYFR Okeechobee FL	11550as	11740na	11830na	17760na
1400 1500 vl	Lesotho, Radio	4800do				1400 1405	Vatican City, Vatican R	15500ou	17515au		
1400 1500	Malaysia, Radio	7295do				1400 1500	Zambia, Christian Voice	9865do			
1400 1500 vl	Malaysia, RTM Kota Kinabalu	5980do				1400 1500 vl	Zimbabwe, Zimbabwe BC	5975do			
1400 1500	Malaysia, RTM Sarawak	7160do				1405 1410	Croatia, Croatian Radio	6165eu	7185eu	7365eu	9830eu
1400 1500	N Marianas, KFBS Saipan	9465as	9495as	9670as		1410 1420 as	Greece, Voice of	9425eu	15630am		
1400 1500 occsnal	New Zealand, R NZ Intl	6105va				1415 1420	Nepal, Radio	3230as	5005as		
1400 1500 vl	Nigeria, Radio/Enugu	6025do				1430 1500	Canada, Radio Canada Intl	11980va	17820af		
1400 1500 vl	Nigeria, Radio/Ibadan	6050do				1430 1500 mtwhf	Canada, Radio Canada Intl	9640na	13650na	17710na	
1400 1500 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	1430 1500 s	Canada, Radio Canada Intl	13655na			
1400 1500 vl	Nigeria, Radio/Lagos	4990do	7285do			1430 1440 mtwhf	Greece, Voice of	9425eu	15630am		
1400 1500 vl	Nigeria, Radio/Lagos	4990do	7285do			1430 1500	Guam, AWR/KSDA	9835as			
1400 1500	Oman, Radio Sultanate of	15140eu				1430 1500	Guam, TWR/KTWR	15330as			
1400 1415	Pakistan, Radio	11570me	15170me	15465me		1430 1500	Myanmar, Radio	5985do			
1400 1500	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as	1430 1500	Netherlands, Radio	12070as	12090as	15590as	
1400 1500 vl	Papua New Guinea, NBC	4890do				1430 1500	S Africa, RTE Radio	21745af			
1400 1455	Poland, Radio Polonia	6095eu	7270eu	9525eu	11820eu	1430 1500	Serbia, Radio Yugoslavia	11835au			
1400 1455 as	S Africa, Channel Africa	21725af				1430 1500	Sweden, Radio	13800va	18960am	21810am	
1400 1500	Sierra Leone, SLBS	5980do									

SELECTED PROGRAMS

Sundays

- 1400 Taiwan, Radio Taipei Intl: News. See S 0200.
1415 Taiwan, Radio Taipei Intl: Instant Noodles. See S 0315.
1430 Netherlands, Radio: News. See S 0050.
1430 Taiwan, Radio Taipei Intl: Mailbag Time. See S 0240.
1430 USA, KTVN Salt Lk City UT: Winning Walk. Ed Young sermonizes from the Second Baptist Church of Houston, Texas.
1438 Netherlands, Radio: Sincerely Yours. See S 1208.
1445 Taiwan, Radio Taipei Intl: Let's Learn Chinese. Chinese lessons with commentary and translation in English.
1454 Netherlands, Radio: The Week Ahead. Howard Shannon talks about upcoming programs (replacing "The Way I See It").

Mondays

- 1400 Taiwan, Radio Taipei Intl: News. See S 0200.
1400 USA, KTVN Salt Lk City UT: Breakthrough. See S 1100.
1415 Taiwan, Radio Taipei Intl: News Link. See M 0315.
1430 Netherlands, Radio: News. See S 0050.
1430 Taiwan, Radio Taipei Intl: Women in Taiwan. See M 0315.
1430 USA, KTVN Salt Lk City UT: Today with Marilyn. Marilyn Hickey teaches.
1438 Netherlands, Radio: Newsline. See M 1200.
1445 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Tuesdays

- 1400 Taiwan, Radio Taipei Intl: News. See S 0200.

- 1400 USA, KTVN Salt Lk City UT: Breakthrough. See S 1100.
1415 Taiwan, Radio Taipei Intl: Taiwan Economic Journal. See T 0315.
1430 Netherlands, Radio: News. See S 0050.
1430 Taiwan, Radio Taipei Intl: Formosa Oldies. See T 0330.
1430 USA, KTVN Salt Lk City UT: Today with Marilyn. See M 1430.
1438 Netherlands, Radio: Newsline. See M 1200.
1445 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Wednesdays

- 1400 Taiwan, Radio Taipei Intl: News. See S 0200.
1400 USA, KTVN Salt Lk City UT: Breakthrough. See S 1100.
1415 Taiwan, Radio Taipei Intl: Floating Air. See W 0315.
1430 Netherlands, Radio: News. See S 0050.
1430 USA, KTVN Salt Lk City UT: Today with Marilyn. See M 1430.
1438 Netherlands, Radio: Newsline. See M 1200.
1445 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Thursdays

- 1400 Taiwan, Radio Taipei Intl: News. See S 0200.
1400 USA, KTVN Salt Lk City UT: Breakthrough. See S 1100.
1415 Taiwan, Radio Taipei Intl: Pages in History. See M 0315.
1430 Netherlands, Radio: News. See S 0050.
1430 USA, KTVN Salt Lk City UT: Today with Marilyn. See M 1430.
1434 Taiwan, Radio Taipei Intl: Life Unusual. See M 0315.
1438 Netherlands, Radio: Newsline. See M 1200.
1450 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Fridays

- 1400 Taiwan, Radio Taipei Intl: News. See S 0200.
1400 USA, KTVN Salt Lk City UT: Breakthrough. See S 1100.
1415 Taiwan, Radio Taipei Intl: Miss Mook's Big Countdown. See F 0315.
1430 Netherlands, Radio: News. See S 0050.
1430 USA, KTVN Salt Lk City UT: Today with Marilyn. See M 1430.
1438 Netherlands, Radio: Newsline. See M 1200.
1445 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.

Saturdays

- 1400 Taiwan, Radio Taipei Intl: News. See S 0200.
1400 USA, KTVN Salt Lk City UT: Gospel Bill. Kids program.
1415 Taiwan, Radio Taipei Intl: Health and Fitness Beat. See M 0315.
1430 Netherlands, Radio: News. See S 0050.
1430 Taiwan, Radio Taipei Intl: Carol's Cafe. See M 0315.
1430 USA, KTVN Salt Lk City UT: Janice's Attic. Janice Smith finds items in her attic to entertain and teach children.
1438 Netherlands, Radio: Europe Unzipped. See S 0103.
1445 Taiwan, Radio Taipei Intl: Let's Learn Chinese. See S 1445.
1454 Netherlands, Radio: Insight. See S 0454.



FREQUENCIES

1500 1600	Anguilla, Caribbean Beacon	11775am				1500 1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1500 1600 vl	Australia, ABC/Alice Springs	2310do				1500 1600 vl	Papua New Guinea, NBC	4890do			
1500 1600 vl	Australia, ABC/Katherine	2485do				1500 1530	S Africa, Channel Africa	17770af			
1500 1600 vl	Australia, ABC/Tennant Creek	2325do				1500 1600	Seychelles, FEBA Radio	11600as			
1500 1600	Australia, Radio	5995as	6180as	9580as	11650as	1500 1600	Sierra Leone, SLBS	5980do			
		11660as				1500 1600	Singapore, Radio Corp Singapore	6150do			
1500 1600 vl	Botswana, Radio	4820do	4830do	7255do		1500 1600	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as
1500 1600 vl	Canada, CBC N Quebec Svc	9625do						15425as			
1500 1600	Canada, CFRX Toronto	6070do				1500 1600	Uganda, Radio	4976do			
1500 1600	Canada, CFVP Calgary	6030do				1500 1600	UK, BBC World Service	5975as	5990as	6190af	6195as
1500 1600	Canada, CHNX Halifax	6130do						9410eu	9515na	9590na	9740as
1500 1600	Canada, CKZN St John's	6160do						11860af	12095eu	15220na	15310as
1500 1600	Canada, CKZU Vancouver	6160do						15400af	15420af	15485eu	15565eu
1500 1600	Canada, Radio Canada Intl	6185as						17630as	17830af	17840am	21470af
1500 1600 s	Canada, Radio Canada Intl	9640na	13655na	17710na				21490af	21660af		
1500 1556	China, China Radio Intl	7160as	7405as	9785as	13685af			9605eu	13640eu	15510eu	
		15125af				1500 1600 a	UK, Merlin Network One	4278am	6458am	12689am	
1500 1600	Costa Rica, RF Peace Intl	25930va				1500 1600	USA, Armed Forces Network	13815na			
1500 1530	Ecuador, HCJB	21455va				1500 1600	USA, KAJJ Dallas TX	11715na			
1500 1600	Ecuador, HCJB	12005am	15115am			1500 1600	USA, KJES Vado NM	7510na			
1500 1600	Eqt Guinea, Radio Africa	15186af				1500 1600	USA, KTBN Salt Lake City UT	9930as			
1500 1600	Germany, Overcomer Ministries	5850eu	13810eu			1500 1600	USA, KWHR Naalehu HI	6110as	9760as	9845as	12040as
1500 1600	Germany, Voice of Hope	15715as				1500 1600	USA, VOA Special English	15460as			
1500 1600	Guam, TWR/KTWR	15330as				1500 1600	USA, Voice of America	7125as	9575as	15205as	15340as
1500 1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as	1500 1600 mtwhf	USA, WBCQ Monticello ME	9340na			
1500 1600	Jordan, Radio	11690eu				1500 1600	USA, WEWN Birmingham AL	11875na			
1500 1600	Kenya, Kenya BC Corp	4915do				1500 1600 mtwhf	USA, WGTG McCaysville GA	9400va	12172am		
1500 1600	Kenya, Kenya BC Corp	4935do				1500 1600	USA, WHRI Noblesville IN	6040sa	15105na		
1500 1600	Lebanon, Voice of Hope	11530va				1500 1600	USA, WJCR Upton KY	7490na	13595na		
1500 1600 vl	Lesotho, Radio	4800do				1500 1600 irreg	USA, WMLK Bethel PA	9465am			
1500 1510	Liberia, LCN/R Liberia Int	5100do				1500 1600	USA, WRNO New Orleans LA	7395na			
1500 1600	Malaysia, Radio	7295do				1500 1600	USA, WTJC Newport NC	9370na			
1500 1600 vl	Malaysia, RTM Kota Kinabalu	5980do				1500 1600	USA, WWCN Nashville TN	9475na	12160na	13845na	15685na
1500 1600	Malaysia, RTM Sarawak	7160do				1500 1600	USA, WYFR Okeechobee FL	11830na	17760na		
1500 1600	N Marianas, KFBS Saipan	9465as	9495as	9670as		1500 1600	Zambia, Christian Voice	9865do			
1500 1600	Netherlands, Radio	12070as	12090as	15590as		1500 1600 vl	Zimbabwe, Zimbabwe BC	5975do			
1500 1505	occsnalNew Zealand, R NZ Intl	6105va				1505 1600	occsnalNew Zealand, R NZ Intl	6145va			
1500 1505	occsnalNew Zealand, R NZ Intl	6105va				1515 1600 vl	Malawi, MBC	3380do			
1500 1600 vl	Nigeria, Radio/Enugu	6025do				1530 1540	Bangladesh, Bangla Betar	4880as	15520as		
1500 1600 vl	Nigeria, Radio/Ibadan	6050do				1530 1600	Iran, VOIRI	7250as	11680as	13605as	15150as
1500 1600 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	1530 1600	Mongolia, Voice of	9720as	12085as		
1500 1600 vl	Nigeria, Radio/Lagos	4990do	7285do			1545 1600 sh	Bangladesh, Bangla Betar	4880as	15520as		
1500 1600 vl	Nigeria, Voice of	7255af	15120va			1550 1600	Vatican City, Vatican R	9865au	13765au	15500au	
1500 1556	North Korea, R Pyongyang	4405va	6574na	9335na	11710na						
		13760na									

SELECTED PROGRAMS

Sundays

- 1500 Netherlands, Radio: Dutch Horizons. See S 1130.
 1500 USA, KTBN Salt Lk City UT: The Coral Ridge Hour. Dr. James Kennedy preaches from the Coral Ridge Presbyterian Church of Fort Lauderdale, Florida.
 1530 Netherlands, Radio: Aural Tapestry. See S 0000.
 1554 Netherlands, Radio: News. See S 0050.

Mondays

- 1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
 1508 Netherlands, Radio: Research File. See M 1138.
 1530 Netherlands, Radio: News. See S 0050.
 1530 USA, KTBN Salt Lk City UT: A Date with Dale. Dale Evans Rogers sings and talks with a guest.
 1538 Netherlands, Radio: EuroQuest. See M 1108.

Tuesdays

- 1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
 1508 Netherlands, Radio: Music 52-15. See T 1138.
 1530 Netherlands, Radio: News. See S 0050.
 1530 USA, KTBN Salt Lk City UT: Calling Dr. Whitaker. See T 0630.
 1538 Netherlands, Radio: A Good Life. See T 1108.

Wednesdays

- 1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
 1508 Netherlands, Radio: Documentary. See W 1138.
 1530 Netherlands, Radio: News. See S 0050.

- 1530 USA, KTBN Salt Lk City UT: Lifestyle Magazine. A Faith for Today production that has brought family values to television since 1950.
 1538 Netherlands, Radio: Dutch Horizons. See S 1130.

Thursdays

- 1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
 1508 Netherlands, Radio: Media Network. See H 1138.
 1530 Netherlands, Radio: News. See S 0050.
 1530 USA, KTBN Salt Lk City UT: Steve Brock. Steve sings songs of praise.
 1538 Netherlands, Radio: Research File. See M 1138.

Fridays

- 1500 USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0100.
 1508 Netherlands, Radio: A Good Life. See T 1108.
 1518 Netherlands, Radio: Roughly Speaking. See S 0030.
 1530 Netherlands, Radio: News. See S 0050.
 1530 USA, KTBN Salt Lk City UT: God's News Behind the News. Ray Brubaker presents the "news" from St. Petersburg, Florida.
 1538 Netherlands, Radio: Documentary. See W 1138.

Saturdays

- 1500 USA, KTBN Salt Lk City UT: Just the Facts. A program for youth ages 10 to 16.
 1508 Netherlands, Radio: Aural Tapestry. See S 0000.
 1530 Netherlands, Radio: Roughly Speaking. See S 0030.
 1530 USA, KTBN Salt Lk City UT: Kids Against Crime. See A 1200.
 1554 Netherlands, Radio: News. See S 0050.

Hauser's Highlights

ECUADOR: HCJB

A-00 in English with power, azimuth:

0000 0400	9745	100	351	N. Amer. (E)
0000 1530	21455	1	35/225	Eur./S. Pac.
0000 0700	15115	50	330	N. America
0400 0700	9745	100	325	N Amer. (W)
0700 0900	15150	50	34	Europe
0700 1100	11755	100	228	S. Pacific
1100 1630	12005	50	43	Caribbean
1100 1630	15115	100	160/353	N/S America
1900 2200	17660	100	41	Europe

(HCJB via Wolfgang Büschel, *DX Listening Digest*)



FREQUENCIES

1600 1700	Algeria, R Algiers Intl	11715af	15160me	1600 1700 vl	Papua New Guinea, NBC	4890do			
1600 1700	Anguilla, Caribbean Beacon	11775am		1600 1700	Russia, Voice of Russia WS	7260me	9800as	9875as	11500as
1600 1700 vl	Australia, ABC/Alice Springs	2310do				11695as			
1600 1700 vl	Australia, ABC/Katherine	2485do		1600 1630	S Africa, Channel Africa	9525af			
1600 1700 vl	Australia, ABC/Tennant Creek	2325do		1600 1700	Sierra Leone, SLBS	5980do			
1600 1700	Australia, Radio	5995as	6180as 9500as 9580as	1600 1700	South Korea, R Korea Intl	5975om	9515af	9870af	
		11650as	11660as	1600 1700	Swaziland, Trans World R	9500af			
1600 1630	Austria, Radio Austria Intl	17865na		1600 1615	Switzerland, Swiss R Intl	12010as	15185as		
1600 1700 vl	Botswana, Radio	4820do	4830do 7255do	1600 1640	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600 1700 vl	Canada, CBC N Quebec Svc	9625do		1600 1700	Uganda, Radio	4976do			
1600 1700	Canada, CFRX Toronto	6070do				3195as	5975as	5990as	6190af
1600 1700	Canada, CFVP Calgary	6030do				6195as	7160as	9410eu	9515na
1600 1700	Canada, CHNX Halifax	6130do				9740as	11940af	12095eu	15240af
1600 1700	Canada, CKZN St John's	6160do				15310as	15400af	15545eu	15565eu
1600 1700	Canada, CKZU Vancouver	6160do				17630as	17830af	17840am	21470af
1600 1659 s	Canada, Radio Canada Intl	9640na	13655na 17710na			21660af			
1600 1656	China, China Radio Intl	9565af	9870af	1600 1700 a	UK, Merlin Network One	3965eu	9655eu		
1600 1700	Costa Rica, RF Peace Intl	25930va		1600 1700	UK, Merlin Network One	3965eu	9655eu		
1600 1630	Ecuador, HCBJ	12005am	15115am	1600 1700	UK, Merlin Network One	9655eu			
1600 1700	Eq Guinea, Radio Africa	15186af		1600 1700	USA, Armed Forces Network	4278am	6458am	12689am	
1600 1700	Ethiopia, Radio	7165af	9560af 11800af	1600 1700	USA, KAIJ Dallas TX	13815va			
1600 1700	France, Radio France Intl	11615af	11995af 12015af 15210af	1600 1700	USA, KJES Vado NM	11715na			
		17850af		1600 1700	USA, KTNB Salt Lake City UT	15590na			
1600 1645	Germany, Deutsche Welle	6140eu	6170as 7225as 9735af	1600 1700	USA, KWHR Naalehu HI	9930as			
		11785as	15145af 15380as 17800af	1600 1700	USA, VOA Special English	13600af	15445af	17895af	
		17810as		1600 1700	USA, Voice of America	6035af	6110as	7125as	9575as
1600 1700 a	Germany, Good News World R	15105af	13810me			9760as	11920af	12040af	13710af
1600 1700	Germany, Overcomer Ministries	5850eu				15205as	15225af	15240af	21635as
1600 1630 s	Germany, Universal Life	15105af		1600 1700 mtwhf	USA, WBCQ Monticello ME	9340na			
1600 1630	Germany, Voice of Hope	15715as		1600 1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600 1700	Guam, AWR/KSDA	9355as		1600 1700	USA, WGTG McCaysville GA	9400va	12172am		
1600 1630 as	Guam, TWR/KTWR	15330as		1600 1700	USA, WHRA Greenbush ME	17650af			
1600 1630	Iran, VOIRI	7250as	11680as 13605as 15150as	1600 1700	USA, WHRI Noblesville IN	13760na	15105as		
1600 1630	Jordan, Radio	11690eu		1600 1700	USA, WJCR Upton KY	7490na	13595na		
1600 1700 mtwhf	Kenya, Kenya BC Corp	4915do		1600 1700	USA, WRNO New Orleans LA	7395na	15420va		
1600 1700 mtwhf	Kenya, Kenya BC Corp	4935do		1600 1700	USA, WSHB Cypress Crk SC	18910af			
1600 1700	Lebanon, Voice of Hope	6280me	11530va	1600 1700	USA, WTJC Newport NC	9370na			
1600 1700 vl	Lesotho, Radio	4800do		1600 1700	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1600 1700 vl	Malawi, MBC	3380do		1600 1700	USA, WYFR Okeechobee FL	11830na	15215na	15695eu	17510eu
1600 1700	Malaysia, Radio	7295do				17760na	21525af		
1600 1630	Mexico, Radio Mexico Intl	9705am		1600 1630 a	Vatican City, Vatican R	9865au	13765au	15500au	
1600 1700	N Marianas, KFBS Saipan	9465as	9495as	1600 1700	Zambia, Christian Voice	4965do			
1600 1625	Netherlands, Radio	12070as	12090as 15590as	1600 1630 vl	Zimbabwe, Zimbabwe BC	5975do			
1600 1650	occsnal New Zealand, R NZ Intl	6145va		1605 1615 mtwhf	UK, BBC World Service	5990as			
1600 1700 vl	Nigeria, Radio/Enugu	6025do		1615 1630 a	UK, BBC World Service	11860af			
1600 1700 vl	Nigeria, Radio/Ibadan	6050do		1630 1700	Egypt, Radio Cairo	15255af			
1600 1700 vl	Nigeria, Radio/Kaduna	4770do	6090do 7275do 9570do	1630 1700 s	Seychelles, FEBA Radio	11605as			
1600 1700 vl	Nigeria, Radio/Lagos	3326do	4990do	1630 1645 a	UK, BBC World Service	9515na	11860af		
1600 1700	Nigeria, Voice of	7255af	15120va	1630 1657	Vietnam, Voice of	7145eu	9730eu		
1600 1656	North Korea, R Pyongyang	3560va	6540va 9600va 9975va	1630 1700 vl	Zimbabwe, Zimbabwe BC	4828do			
1600 1630	Pakistan, Radio	7230do	11570me 15320af 15465me	1645 1700	Germany, Deutsche Welle	6140eu			
		17510me	17720af	1645 1700 a	UK, BBC World Service	9515na			
		9955as	9965as	1645 1700 smwfa	UK, BBC World Service	11860af			
1600 1700	Palau, KHBN/Voice of Hope			1650 1700 mtwhf	New Zealand, R NZ Intl	17675va			

SELECTED PROGRAMS

Sundays

- 1600 USA, KTNB Salt Lk City UT: Love Worth Finding. Dr. Adrian Rogers of Memphis, Tennessee delivers biblical teaching and loving encouragement to people all over the world.
- 1608 Netherlands, Radio: Wide Angle. The weekend edition of Newsline produced by the current affairs team.
- 1630 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 1633 Slovakia, R Slovakia Intl: Sunday Newsreel. A review of the week's news.
- 1637 Slovakia, R Slovakia Intl: Listeners' Tribune. Slovakia's mailbag program.

Mondays

- 1600 Netherlands, Radio: Newsline. See M 1200.
- 1600 USA, KTNB Salt Lk City UT: The Music of Praise. Ray Jones plays contemporary christian music in this hour of alternate programming.
- 1630 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 1633 Slovakia, R Slovakia Intl: News. See S 0103.
- 1638 Slovakia, R Slovakia Intl: Topical Issue. Current affairs in Slovakia.
- 1641 Slovakia, R Slovakia Intl: Slovak Weather News. A regional weather summary.
- 1643 Slovakia, R Slovakia Intl: Slovak Personalities (biweekly). New program.
- 1643 Slovakia, R Slovakia Intl: Tourism News (biweekly). Talk about skiing and other seasonal activities for visitors.

Tuesdays

- 1600 Netherlands, Radio: Newsline. See M 1200.
- 1600 USA, KTNB Salt Lk City UT: The Music of Praise. See M 1600.
- 1630 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 1633 Slovakia, R Slovakia Intl: News. See S 0103.
- 1636 Slovakia, R Slovakia Intl: Topical Issue. See M 1638.
- 1639 Slovakia, R Slovakia Intl: Slovakia and the World. See S 0100.
- 1649 Slovakia, R Slovakia Intl: Sports News. Report on sports in Slovakia.

Wednesdays

- 1600 Netherlands, Radio: Newsline. See M 1200.
- 1600 USA, KTNB Salt Lk City UT: The Music of Praise. See M 1600.
- 1630 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 1633 Slovakia, R Slovakia Intl: News. See S 0103.
- 1636 Slovakia, R Slovakia Intl: Topical Issue. See M 1638.
- 1649 Slovakia, R Slovakia Intl: Business News. The latest reports from the world of Slovak business and finance.
- 1654 Slovakia, R Slovakia Intl: Currency Notes. See M 1643.

Thursdays

- 1600 Netherlands, Radio: Newsline. See M 1200.
- 1600 USA, KTNB Salt Lk City UT: The Music of Praise. See M 1600.
- 1630 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 1633 Slovakia, R Slovakia Intl: News. See S 0103.
- 1639 Slovakia, R Slovakia Intl: Topical Issue. See M 1638.
- 1645 Slovakia, R Slovakia Intl: Back Page News (biweekly). Offbeat items from the news.

- 1645 Slovakia, R Slovakia Intl: Culture (biweekly). The arts in Slovakia.
- 1651 Slovakia, R Slovakia Intl: Slovak Kitchen (biweekly). Learn how to cook Slovak style.
- 1651 Slovakia, R Slovakia Intl: Slovak Lesson (biweekly). Everyday Slovak for travelers.

Fridays

- 1600 Netherlands, Radio: Newsline. See M 1200.
- 1600 USA, KTNB Salt Lk City UT: The Music of Praise. See M 1600.
- 1630 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 1633 Slovakia, R Slovakia Intl: News. See S 0103.
- 1640 Slovakia, R Slovakia Intl: Topical Issue. See M 1638.
- 1645 Slovakia, R Slovakia Intl: Social-Political Panorama. See M 1643.
- 1655 Slovakia, R Slovakia Intl: Regional News. Important stories from Slovakia's provincial press.

Saturdays

- 1600 USA, KTNB Salt Lk City UT: Just the Facts. See A 1500.
- 1608 Netherlands, Radio: Europe Unzipped. See S 0103.
- 1630 Slovakia, R Slovakia Intl: Slovakia Today. See S 0100.
- 1630 USA, KTNB Salt Lk City UT: Kids Like You. Miss Cathie hosts this program for children.
- 1633 Slovakia, R Slovakia Intl: News. See S 0103.
- 1640 Slovakia, R Slovakia Intl: Slovak Dailies Front Page Review. See S 0110.
- 1645 Slovakia, R Slovakia Intl: Best of RSI. See S 0115.



FREQUENCIES

1700	1730		Afghanistan, VO Shariah	4774do	7077do					1800	1900		Anguilla, Caribbean Beacon	11775am				
1700	1800		Anguilla, Caribbean Beacon	11775am						1800	1900		Argentina, RAE	15345eu				
1700	1800	vl	Australia, ABC/Alice Springs	2310do						1800	1900	vl	Australia, ABC/Alice Springs	2310do				
1700	1800	vl	Australia, ABC/Katherine	2485do						1800	1900	vl	Australia, ABC/Katherine	2485do				
1700	1800	vl	Australia, ABC/Tennant Creek	2325do						1800	1900	vl	Australia, ABC/Tennant Creek	2325do				
1700	1800		Australia, Radio	5995as	6180as	9500as	9580as			1800	1900		Australia, Radio	6080as	7240as	9500as	9580as	
				9660as	11880as									9600as	11880as			
1700	1800	vl	Botswana, Radio	4820do	4830do	7255do				1800	1900		Bangladesh, Bangla Betar	7185eu				
1700	1800	vl	Canada, CBC N Quebec Svc	9625do						1800	1900	vl	Botswana, Radio	4820do				
1700	1800		Canada, CFRX Toronto	6070do						1800	1900		Canada, CFRX Toronto	6070do				
1700	1800		Canada, CFVP Calgary	6030do						1800	1900		Canada, CFVP Calgary	6030do				
1700	1800		Canada, CHNX Halifax	6130do						1800	1900		Canada, CHNX Halifax	6130do				
1700	1800		Canada, CKZN St John's	6160do						1800	1900		Canada, CKZN St John's	6160do				
1700	1800		Canada, CKZU Vancouver	6160do						1800	1900		Canada, CKZU Vancouver	6160do				
1700	1756		China, China Radio Intl	7150af	7405af	9570af	9670af			1800	1827		Czech Rep, R Prague Intl	5930eu	7315va			
				11910af	15300af					1800	1830		Egypt, Radio Cairo	15255af				
1700	1800		Costa Rica, RF Peace Intl	25930va						1800	1900		Eqt Guinea, Radio Africa	15186af				
1700	1727		Czech Rep, R Prague Intl	5930eu	17485af					1800	1900		Germany, Deutsche Welle	6140eu				
1700	1800		Egypt, Radio Cairo	15255af						1800	1900	vl	Ghana, Ghana BC Corp	4915do				
1700	1800		Eqt Guinea, Radio Africa	15186af						1800	1815		Greece, Voice of	7450eu	9425eu	17565sa	17705na	
1700	1730		France, Radio France Intl	11615af	15210af					1800	1900		India, All India Radio	7410eu	9950eu	11620eu	11935af	
1700	1800		Germany, Deutsche Welle	6140eu										13750af	15075af	15200af		
1700	1800	a	Germany, Good News World R	11795me						1800	1900	vl	Italy, IRRS	3985va				
1700	1800		Germany, Voice of Hope	11725as						1800	1900	mtwhfa	Kenya, Kenya BC Corp	4915do				
1700	1800	vl	Ghana, Ghana BC Corp	4915do						1800	1900	mtwhf	Kenya, Kenya BC Corp	4935do				
1700	1800		Japan, Radio/NHK	9825eu	12000na	15355af				1800	1900		Kuwait, Radio	11990va				
1700	1800	mtwhfa	Kenya, Kenya BC Corp	4915do						1800	1900	vl	Lesotho, Radio	4800do				
1700	1800	mtwhf	Kenya, Kenya BC Corp	4935do						1800	1815		Liberia, LCN/R Liberia Int	5100do				
1700	1800		Lebanon, Voice of Hope	6280me	11530va					1800	1900	vl	Malawi, MBC	3380do				
1700	1800	vl	Lesotho, Radio	4800do						1800	1900		Malaysia, Radio	7295do				
1700	1800	vl	Malawi, MBC	3380do						1800	1900		N Marianas, KFB5 Saipan	9465as				
1700	1800		Malaysia, Radio	7295do</														

2000	2100		Algeria, R Algiers Intl	11715af	15160me		
2000	2100		Angola, Radio Nacional	3355af			
2000	2100		Anguilla, Caribbean Beacon	11775am			
2000	2100	vl	Australia, ABC/Alice Springs	2310do			
2000	2100	vl	Australia, ABC/Katherine	2485do			
2000	2100	vl	Australia, ABC/Tennant Creek	2325do			
2000	2100		Australia, Radio	9500as	9580as	9660as	11880as
				12080as			
2000	2100	as	Australia, Radio	6080as	7240as		
2000	2100	vl	Botswana, Radio	4820do	4830do		
2000	2100		Canada, CFRX Toronto	6070do			
2000	2100		Canada, CFVP Calgary	6030do			
2000	2100		Canada, CHNX Halifax	6130do			
2000	2100		Canada, CKZN St John's	6160do			
2000	2100		Canada, CKZU Vancouver	6160do			
2000	2056		China, China Radio Intl	5965eu	7590af	9440af	9535eu
				11735af	11840af	11975af	13675af
				15360af	15500af		
				25930va			
2000	2100		Costa Rica, RF Peace Intl	17660eu			
2000	2100		Ecuador, HCJB	15186af			
2000	2100		Eat Guinea, Radio Africa	9725eu			
2000	2045		Germany, Deutsche Welle	3965eu			
2000	2100		Germany, Overcomer Ministries	4915do			
2000	2100	vl	Ghana, Ghana BC Corp	5980am			
2000	2100		Guatemala, Adv World Radio	11784va			
2000	2100		Indonesia, Voice of	7215eu	9022eu	9880eu	
2000	2030		Iran, VOIRI	3985va			
2000	2100	vl	Italy, IRRS	4915do			
2000	2100	mtwhfa	Kenya, Kenya BC Corp	4935do			
2000	2100	mtwhf	Kenya, Kenya BC Corp	9810do			
2000	2100		Kiribati, Radio	11990va			
2000	2100		Kuwait, Radio	4800do			
2000	2100	vl	Lesotho, Radio	5100do			
2000	2055		Liberia, LCN/R Liberia Int	3380do			
2000	2100	vl	Malawi, MBC	7295do			
2000	2100		Malaysia, Radio	9720eu	12085eu		
2000	2030		Mongolia, Voice of	3270af	3289af		
2000	2100		Namibia, NBC	6020af	9895af	11655af	13700af
2000	2025		Netherlands, Radio	17605af			
				17675va			
2000	2100		New Zealand, R NZ Intl	5019do			
2000	2015	vl	Niger, Voice du Sahel	6025do			
2000	2100	vl	Nigeria, Radio/Enugu	6050do	6090do	7275do	9570do
2000	2100	vl	Nigeria, Radio/Ibadan	4770do	4990do		
2000	2100	vl	Nigeria, Radio/Kaduna	3326do	11220va		
2000	2100	vl	Nigeria, Radio/Lagos	7255af			
2000	2100		Nigeria, Voice of	9675do			
2000	2100	vl	Papua New Guinea, NBC	5920eu	5940eu	5965eu	7205va
2000	2100		Russia, Voice of Russia WS	7340eu	9480eu	9830af	9875af
				9890eu	11510af		
2000	2005		S Africa, Voice of Hope	6290af			
2000	2100		Sierra Leone, SLBS	3316do			
2000	2100	vl	Solomon Islands, SIBC	5020do			
2000	2100	mtwhf	Spain, R Exterior Espana	9595af	9680eu		
2000	2100		Swaziland, Trans World R	3200af			
2000	2030		Switzerland, Swiss R Intl	6620af	11910af	13660af	13790af
2000	2100		Uganda, Radio	4976do			
2000	2100		UK, BBC World Service	3255af	3955eu	5975pa	6005af
				6190af	6195eu	9410eu	9630af
				9740pa	11835af	12095af	15400af
				17830af			
2000	2100		USA, Armed Forces Network	4278am	6458am	12689am	
2000	2100		USA, KAIJ Dallas TX	13815va			
2000	2100		USA, KJES Vado NM	15385na			
2000	2100		USA, KTVN Salt Lake City UT	15590na			
2000	2100		USA, KWHR Naalehu HI	17510as			
2000	2100		USA, Voice of America	4950af	6035af	6095as	7415af
				9760as	11855af	11975af	13710af
				15420af	15580af	17725af	17885af
				9340na			
2000	2100	mtwhf	USA, WBCQ Monticello ME	11875na	13615na	15745eu	
2000	2100		USA, WEWN Birmingham AL	9400va	12172am		
2000	2100		USA, WGTG McCaysville GA	17650af			
2000	2100		USA, WHRA Greenbush ME	9495na	13760na		
2000	2100		USA, WHRI Noblesville IN	13790eu			
2000	2100		USA, WINB Red Lion PA	7490na	13595na		
2000	2100		USA, WJRC Upton KY	7395na	15420va		
2000	2100		USA, WRNO New Orleans LA	15665eu	18910af		
2000	2100		USA, WSHB Cypress Crk SC	9370na			
2000	2100		USA, WTJC Newport NC	9475na	12160na	13845na	15685na
2000	2100		USA, WWSR Nashville TN	7355eu	11565eu	15565af	21525af
2000	2100		USA, WYFR Okeechobee FL	4960do			
2000	2100	vl	Vanuatu, Radio	9660af	11625af	13765af	
2000	2030		Vatican City, Vatican R	9730eu			
2000	2027		Vietnam, Voice of	4965do			
2000	2100		Zambia, Christian Voice	4828do			
2000	2100	vl	Zimbabwe, Zimbabwe BC	13830eu			
2005	2010		Croatia, Croatian Radio	12085eu	13610eu		
2005	2100		Syria, Radio Damascus	15235va	15415va	15435va	
2015	2100	vl	Libya, Voice of Africa	7220af	9710af	11880af	
2025	2045		Italy, RAI Intl	13660eu	13715eu	13750eu	
2030	2100		Cuba, Radio Havana	15375af			
2030	2100		Egypt, Radio Cairo	11760eu			
2030	2100		Georgia, Georgian Radio	9640af			
2030	2100		Germany, AWR Europe	9745af			
2030	2100		S Africa, AWR Africa	6100eu			
2030	2100		Serbia, Radio Yugoslavia	5915eu	6055eu	7345eu	
2030	2100		Slovakia, R Slovakia Intl	6065eu			
2030	2100		Sweden, Radio	9535eu	9655eu	11905eu	
2030	2045		Thailand, Radio	9525eu			
2030	2100	as	Turkey, Voice of	4950af			
2030	2100		USA, Voice of America	7145eu	7410eu	9650eu	9910ou
2030	2057		Vietnam, Voice of	17150ou	11620va	11715ou	
2045	2100		India, All India Radio	9950eu	9965eu		
2055	2100	mtwhfa	Armenia, Voice of	4810eu			

FREQUENCIES

2100	2200	mtwhf	Anguilla, Caribbean Beacon	11775am			
2100	2115		Armenia, Voice of	4810eu	9965eu		
2100	2130	vl	Australia, ABC/Alice Springs	2310do			
2100	2130	vl	Australia, ABC/Katherine	2485do			
2100	2200	vl	Australia, ABC/Katherine	5025do			
2100	2130	vl	Australia, ABC/Tennant Creek	2325do			
2100	2130		Australia, Radio	7240as 11880as 3356do 9400eu 9625do 6070do 6030do 6130do 6160do 6160do	9500as 12080as 4820do 11700eu	9580as 21740as	9660as
2100	2200	vl	Botswana, Radio	3356do			
2100	2200		Bulgaria, Radio	9400eu			
2100	2200	vl	Canada, CBC N Quebec Svc	9625do			
2100	2200		Canada, CFRX Toronto	6070do			
2100	2200		Canada, CFVP Calgary	6030do			
2100	2200		Canada, CHNX Halifax	6130do			
2100	2200		Canada, CKZN St John's	6160do			
2100	2200		Canada, CKZU Vancouver	6160do			
2100	2200		Canada, Radio Canada Intl	5995va 11945va 17820va 15050va 13750eu 5930na 17660eu 15375af 15186af 9615af 15410va	7235va 13650va 13690va 25930va	9770va 9805va 15325va	
2100	2200		Costa Rica, RF Peace Intl	15050va			
2100	2130		Cuba, Radio Havana	13750eu			
2100	2127		Czech Rep, R Prague Intl	5930na	9430as		
2100	2200		Ecuador, HCJB	17660eu			
2100	2200		Egypt, Radio Cairo	15375af			
2100	2200		Eqt Guinea, Radio Africa	15186af			
2100	2145		Germany, Deutsche Welle	9615af 15410va	9690af 17560as	9765as	15135as
2100	2130		Hungary, Radio Budapest	6025eu			
2100	2200		India, All India Radio	7150va 9950eu 9685va 3985va 6035pa 4935do 9810do 4800do 5000do 3380do 7295do 7440eu 3270af 3289af 17675va 6025do 6050do 4770do 3326do 9985as 9675do 5955eu 5940eu 7340eu	7410eu 11620va 11715au 11787va	9650eu 9910au	
2100	2200	irreg	Iraq, Radio Iraq Intl	9685va			
2100	2200	vl	Italy, IRRS	3985va			
2100	2200		Japan, Radio/NHK	6035pa	9725eu	11850pa	17825va
2100	2130	mtwhf	Kenya, Kenya BC Corp	4935do			
2100	2130		Kiribati, Radio	9810do			
2100	2200	vl	Lesotho, Radio	4800do			
2100	2115		Liberia, LCN/R Liberia Int	5000do			
2100	2200	vl	Malawi, MBC	3380do			
2100	2200		Malaysia, Radio	7295do			
2100	2200	mtwhf	Malta, V of Mediterranean	7440eu			
2100	2200		Namibia, NBC	3270af	3289af		
2100	2200		New Zealand, R NZ Intl	17675va			
2100	2200	vl	Nigeria, Radio/Enugu	6025do			
2100	2200	vl	Nigeria, Radio/Ibadan	6050do			
2100	2200	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
2100	2200	vl	Nigeria, Radio/Lagos	3326do	4990do		
2100	2200		Palau, KHBN/Voice of Hope	9985as			
2100	2200	vl	Papua New Guinea, NBC	9675do			
2100	2156		Romania, R Romania Intl	5955eu	7195eu	7215eu	9690eu
2100	2200		Russia, Voice of Russia WS	5940eu 7340eu	5965eu 9480eu	6205eu 9890eu	7320eu
2100	2200		Sierra Leone, SLBS	3316do			
2100	2200	vl	Solomon Islands, SIBC	5020do			
2100	2130		South Korea, R Korea Intl	6480eu	15575eu		
2100	2200		Swaziland, Trans World R	3200af			
2100	2130		Switzerland, Swiss R Intl	6165eu			
2100	2105		Syria, Radio Damascus	12085eu	13610eu		
2100	2200		UK, BBC World Service	3255af 5975va 6195va 12095sa	3915as 6005af 9410pa 15400af	3955eu 6180eu 9740pa	5965as 6190af 11835af
2100	2200		USA, Armed Forces Network	4278am	6458am	12689am	
2100	2200		USA, KAIJ Dallas TX	13815va			
2100	2200		USA, KTBN Salt Lake City UT	15590na			
2100	2200		USA, KWHR Naalehu HI	17510as			
2100	2200		USA, Voice of America	6035af 9595as 13710af 17725af	6040me 9760as 15185pa 17735as	6095as 11870pa 15240af 17820as	7415af 11975af 15580af
2100	2200		USA, WBCQ Monticello ME	7415na			
2100	2200	mtwhf	USA, WBCQ Monticello ME	9340na			
2100	2200		USA, WEWN Birmingham AL	9975eu	11875na	13615na	
2100	2200		USA, WGTG McCaysville GA	9400va	12172am		
2100	2200		USA, WHRA Greenbush ME	17650af			
2100	2200		USA, WHRI Noblesville IN	5745na	9495sa		
2100	2200		USA, WINB Red Lion PA	13790eu			
2100	2200		USA, WJCR Upton KY	7490na	13595na		
2100	2200	s	USA, WRMI/R Miami Intl	9955am			
2100	2200		USA, WRNO New Orleans LA	7395na	15420va		
2100	2200		USA, WSHB Cypress Crk SC	15665eu	18910af		
2100	2200		USA, WTJC Newport NC	9370na			
2100	2200		USA, WWCN Nashville TN	7435na	9475na	12160na	13845na
2100	2200		USA, WYFR Okeechobee FL	7355eu	11565af	15565af	21525af
2100	2200	vl	Vanuatu, Radio	4960do			
2100	2200		Zambia, Christian Voice	4965do			
2100	2200	vl	Zimbabwe, Zimbabwe BC	4828do			
2110	2200	s	Greece, Voice of	9425as 12085na	11645va 13610na		
2110	2200		Syria, Radio Damascus	9990eu			
2115	2200		Egypt, Radio Cairo	5975am	11765am	15390am	
2115	2130	mtwhf	UK, BBC Caribbean Report	5975na			
2115	2130	as	UK, BBC World Service	4910do			
2130	2200	vl	Australia, ABC/Tennant Creek	7240as	9660as	11880as	12080as
2130	2200		Australia, Radio	15415as 7105eu 5965eu 15500af	17580as 7210eu 7590eu	21740as	
2130	2200	th	Belarus, Radio Minsk	7105eu			
2130	2156		China, China Radio Intl	5965eu	9535eu		13675af
2130	2200		Guam, AWR/KSDA	9495as	11985as		
2130	2200		Hungary, Radio Budapest	3975eu			

2130	2200		Iran, VOIRI	11740as	13720as	13745as	9525eu
2130	2200		Poland, Radio Polonia	6035eu	6095eu	7285eu	
2130	2200		South Korea, R Korea Intl	15575eu			
2130	2145	f	UK, BBC Calling Falklands	11680sa			
2130	2200		UK, Merlin Network One	6010eu			
2130	2200	smtwhf	USA, Voice of America	6035af 15240af 7105eu 7385na 4005eu	7415af 15580af 9540eu	11975af 17725af	13710af
2130	2200		Uzbekistan, R Tashkent	15240af			
2145	2200	mtwhf	USA, WRMI/R Miami Intl	7385na			
2150	2200		Vatican City, Vatican R	4005eu	5883eu	7250eu	

2200

2200	2300		Anguilla, Caribbean Beacon	6090am			
2200	2300	vl	Australia, ABC/Katherine	5025do			
2200	2300	vl	Australia, ABC/Tennant Creek	4910do			
2200	2300		Australia, Radio	9660as 17705as	12080as 17795as	15415as 21740as	17580as
2200	2300		Canada, CBC N Quebec Svc	9625do			
2200	2300		Canada, CFRX Toronto	6070do			
2200	2300		Canada, CFVP Calgary	6030do			
2200	2300		Canada, CHNX Halifax	6130do			
2200	2300		Canada, CKZN St John's	6160do			
2200	2300		Canada, CKZU Vancouver	6160do			
2200	2259		Canada, Radio Canada Intl	5995va 13690va	7235va 15325va	9805va	11705as
2200	2256		China, China Radio Intl	7170eu			
2200	2300		Costa Rica, RF Peace Intl	15050va	25930va		
2200	2245		Egypt, Radio Cairo	9990eu			
2200	2300		Eqt Guinea, Radio Africa	15186af			
2200	2300		Germany, Overcomer Ministries	7285sa			
2200	2300	vl	Ghana, Ghana BC Corp	4915do			
2200	2210	s	Greece, Voice of	9425au	11645au		
2200	2230		India, All India Radio	7150va 9950eu	7410eu 11620va	9650eu 11715au	9910au
2200	2230		Iran, VOIRI	11740as	13720as	13745as	
2200	2300	vl	Italy, IRRS	3985va			
2200	2225		Italy, RAI Intl	9675as	11900as		
2200	2215		Liberia, LCN/R Liberia Int	5100do			
2200	2210	vl	Malawi, MBC	3380do			
2200	2300		Malaysia, Radio	7295do			
2200	2300		Namibia, NBC	3270af	3289af		
2200	2300		New Zealand, R NZ Intl	17675va			
2200	2300	vl	Nigeria, Radio/Enugu	6025do			
2200	2300	vl	Nigeria, Radio/Ibadan	6050do			
2200	2300	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
2200	2300	vl	Nigeria, Radio/Lagos	3326do	4990do		
2200	2300	vl	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
2200	2300	vl	Papua New Guinea, NBC	9675do			
2200	2215		Poland, Radio Polonia	6035eu	6095eu	7285eu	9525eu
2200	2300		Russia, Voice of Russia WS	5940eu 7320eu	5965eu 7340eu	6205eu 9890eu	7300eu
2200	2300		Sierra Leone, SLBS	3316do			
2200	2300	vl	Solomon Islands, SIBC	5020do			
2200	2230		South Korea, R Korea Intl	3980eu			
2200	2210		Syria, Radio Damascus	12085na	13610na		
2200	2300		Taiwan, Radio Taiwan Intl	5810eu	9355eu		
2200	2300		Turkey, Voice of	7190as	13640as		
2200	2300		UK, BBC World Service	3955eu 6195va 9915eu 12095sa	5965as 7110as 11835af 15400af	5975na 9590na 11955as	6175na 9660as 12080pa
2200	2300	f	UK, Merlin Network One	6170eu	7165eu	9615eu	
2200	2300		USA, Armed Forces Network	4278am	6458am	12689am	
2200	2300		USA, KAIJ Dallas TX	13815va			
2200	2300		USA, KTBN Salt Lake City UT	15590na			
2200	2300		USA, KWHR Naalehu HI	17510as			
2200	2230		USA, Voice of America	7215as 15185as 6035af 13710af	9770as 15290as 7415af	9890as 17735pa 11975af	11760as 17820as 12080af
2200	2230	mtwhf	USA, Voice of America	13710af			
2200	2300		USA, WBCQ Monticello ME	7415na			
2200	2300		USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2200	2300		USA, WGTG McCaysville GA	9400va	12172am		
2200	2300		USA, WHRA Greenbush ME	17650af			
2200	2300		USA, WHRI Noblesville IN	5745na	9495sa		
2200	2300		USA, WINB Red Lion PA	13790eu			
2200	2300		USA, WJCR Upton KY	7490na	13595na		
2200	2300	mtwhf	USA, WRMI/R Miami Intl	9955am			
2200	2300	a	USA, WRMI/R Miami Intl	7385na			
2200	2300		USA, WRNO New Orleans LA	7395na	15420va		
2200	2300		USA, WSHB Cypress Crk SC	13770eu	15285sa		
2200	2300		USA, WTJC Newport NC	9370na			
2200	2300		USA, WWCN Nashville TN	5070na	7435na	9475na	13845na
2200	2300		USA, WYFR Okeechobee FL	11740na	15565af	21525af	
2200	2300	vl	Vanuatu, Radio	4960do			
2200	2210		Vatican City, Vatican R	4005eu	5883eu	7250eu	
2205	2210		Croatia, Croatian Radio	9405af			
2205	2300	as	Spain, R Exterior Espana	9595af	9680eu		
2230	2300		Austria, Radio Austria Intl	5945eu	6155eu	13730af	
2230	2300	th	Belarus, Radio Minsk	7105eu	7210eu		
2230	2300		Cuba, Radio Havana	9550am			
2230	2257		Czech Rep, R Prague Intl	7345na	9435af		
2230	2255		Moldova, R Moldova Intl	7520eu			
2230	2300		Sweden, Radio	6065eu	7325eu		
2245	2300		India, All India Radio	7410as 13625as	9705as	9950as	11620as
2245	2300		Vatican City, Vatican R	7305au	9600au	11830au	

FREQUENCIES

2300 0000	Anguilla, Caribbean Beacon	6090am				2300 0000	UK, Merlin Network One	3975eu			
2300 0000 vl	Australia, ABC/Katherine	5025do				2300 0000	Ukraine, Radio Ukraine Intl	4820eu	5905eu	6020eu	6030va
2300 0000 vl	Australia, ABC/Tennant Creek	4910do						6080eu	7205eu	7420eu	9560eu
2300 0000	Australia, Radio	9660as	12080as	15415as	17580as			9610eu	9785na	9810va	
		17705as		21740as				4278am	6458am	12689am	
		11700na				2300 0000	USA, Armed Forces Network				
2300 0000	Bulgaria, Radio	9400na				2300 0000	USA, KAJI Dallas TX	13815va			
2300 0000	Canada, ABC N Quebec Svc	9625do				2300 0000	USA, KTBN Salt Lake City UT	15590na			
2300 0000	Canada, CFRX Toronto	6070do				2300 0000	USA, KWHR Naalehu HI	17510as			
2300 0000	Canada, CFVP Calgary	6030do				2300 0000	USA, VOA Special English	6045as	7140as	9545as	11925as
2300 0000	Canada, CHNX Halifax	6130do						15395as			
2300 0000	Canada, CKZN St John's	6160do						7215as	9770as	9890as	11760as
2300 0000	Canada, CKZU Vancouver	6160do						15185as	15290as	17735as	17820as
2300 2330	Canada, Radio Canada Intl	5960na	6040na	9535am	9755na			7415na			
		11865am				2300 0000	USA, WBCQ Monticello ME	9385na	9975eu	13615na	
		5990na				2300 0000	USA, WEWN Birmingham AL	5085va	6890am		
2300 2356	China, China Radio Intl	6975va	15050va	25930va		2300 0000	USA, WGTG McCaysville GA	7580af			
2300 0000	Costa Rica, RF Peace Intl	9550am				2300 0000	USA, WHRA Greenbush ME	5745na	9495sa		
2300 2330	Cuba, Radio Havana	9900am				2300 0000	USA, WHRI Noblesville IN	11950am			
2300 0000	Egypt, Radio Cairo	11985as	13785as			2300 0000	USA, WINB Red Lion PA	7490na	13595na		
2300 0000 a	Finland, YLE/R Finland	9515as	9815as	13690as		2300 0000	USA, WJCR Upton KY	9955am			
2300 2345	Germany, Deutsche Welle	9405sa				2300 0000	USA, WRMI/R Miami Intl	7355na			
2300 0000 s	Germany, Good News World R	4915do				2300 0000	USA, WRNO New Orleans LA	13770va	15285sa		
2300 0000 vl	Ghana, Ghana BC Corp	7410as	9705as	9950as	11620as	2300 0000	USA, WSHB Cypress Crk SC	9370na			
2300 0000	India, All India Radio	13625as				2300 0000	USA, WTJC Newport NC	3215na	5070na	7435na	13845na
		3985va				2300 0000	USA, WWCR Nashville TN	11740na			
2300 2315 vl	Italy, IRRS	5100do				2300 0000	USA, WYFR Okeechobee FL	4960do			
2300 2315	Liberia, LCN/R Liberia Intl	7295do				2300 0000 vl	Vanuatu, Radio	7305au	9600au	11830au	
2300 0000	Malaysia, Radio	3270af	3289af			2300 2315	Vatican City, Vatican R	15235va	15415va	15435va	
2300 0000	Namibia, NBC	17675va				2315 0000 vl	Libya, Voice of Africa	7130eu	9540eu		
2300 2359	New Zealand, R NZ Intl	6025do				2330 0000	Albania, R Tirana Intl	15565na			
2300 2305 vl	Nigeria, Radio/Enugu	6050do				2330 2356	Belgium, R Vlaanderen Intl	5960na	9755na		
2300 2305 vl	Nigeria, Radio/Ibadan	4770do	6090do	7275do	9570do	2330 0000 mtwhf	Canada, Radio Canada Intl	6040na	9535am	11865am	
2300 2305 vl	Nigeria, Radio/Kaduna	3326do	4990do			2330 0000 as	Canada, Radio Canada Intl	7345na	9435na		
2300 2305 vl	Nigeria, Radio/Lagos	9955as	9965as	9985as		2330 2357	Czech Rep, R Prague Intl	3300do			
2300 0000	Palau, KHBN/Voice of Hope	9675do				2330 0000 vl	Guatemala, Radio Cultural	7160do			
2300 0000 vl	Papua New Guinea, NBC	7195eu	9570na	9690eu	11940na	2330 0000	Malaysia, RTM Sarawak	6165na	9845na		
2300 2356	Romania, R Romania Intl	6100eu				2330 0000	Netherlands, Radio	6045as	7130as	7140as	9535as
2300 2330	Serbia, Radio Yugoslavia	3316do						9545as	11805as	11925as	15205as
2300 0000	Sierra Leone, SLBS	6150do						15395as			
2300 0000	Singapore, Radio Corp Singapore	5020do				2330 2357	Vietnam, Voice of	7145as	12020as		
2300 0000 vl	Solomon Islands, SIBC	3915as	5965as	5975na	6035as						
2300 0000	UK, BBC World Service	6175na	6195va	7110as	9590na						
		11945as	11955as	12095sa	15280as						

SELECTED PROGRAMS

Sundays

- 2300 Bulgaria, Radio, Radio: News. See S 0200.
 2300 USA, KTBN Salt Lk City UT: Dr. Clarence MacClendon. See S 0600.
 2300 USA, WBCQ Monticello ME: Le Show.
 2310 Bulgaria, Radio, Radio: News Behind the News. See S 0210.
 2325 Bulgaria, Radio, Radio: Plaza Bulgaria. Thirty minutes about Bulgaria and things Bulgarian.
 2330 Netherlands, Radio: News. See S 0050.
 2330 USA, KTBN Salt Lk City UT: The Living Way. Jack Hayford preaches from The Church on the Way in Van Nuys, California.
 2338 Netherlands, Radio: Sincerely Yours. See S 1208.
 2340 Bulgaria, Radio, Radio: Answering Your Letters. Replies to listener letters and Bulgarian Music.
 2354 Netherlands, Radio: The Week Ahead. See S 1454.

Monday-Friday

- 2300 Bulgaria, Radio, Radio: News. See S 0200.
 2330 Netherlands, Radio: News. See S 0050.
 2338 Netherlands, Radio: Newline. See M 1200.

Mondays

- 2300 USA, KTBN Salt Lk City UT: Doctor to Doctor. Helen Pensanti, M.D. hosts a lively discussion-oriented show with doctors from across the U.S.
 2300 USA, WBCQ Monticello ME: Financial Survival.
 2310 Bulgaria, Radio, Radio: News Behind the News. See S 0210.
 2325 Bulgaria, Radio, Radio: Broadcast Talk. New program.
 2330 USA, KTBN Salt Lk City UT: Get Ready. Bishop Jakes preaches from Crenshaw Christian Center in Los Angeles.

Tuesdays

- 2300 USA, WBCQ Monticello ME: Financial Survival.
 2310 Bulgaria, Radio, Radio: Events and Development. See T 1110.

- 2325 Bulgaria, Radio, Radio: Art and Artists. A look at a cultural event, musician, or performer in Bulgaria.
 2330 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 2330 USA, KTBN Salt Lk City UT: Dr. Mark Chironna. See S 0600.
 2341 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.

Wednesdays

- 2300 USA, KTBN Salt Lk City UT: Praise the Lord. See S 0400.
 2300 USA, WBCQ Monticello ME: Financial Survival.
 2310 Bulgaria, Radio, Radio: Events and Development. See T 1110.
 2325 Bulgaria, Radio, Radio: Art and Artists. See T 2325.
 2342 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 2346 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.

Thursdays

- 2300 USA, KTBN Salt Lk City UT: Jerry Barnard. Services from the Cathedral of Faith in San Jose, CA.
 2300 USA, WBCQ Monticello ME: Financial Survival.
 2310 Bulgaria, Radio, Radio: Events and Development. See T 1110.
 2325 Bulgaria, Radio, Radio: The Way We Live. A program that offers a broad range of topics on Bulgarian life.
 2330 USA, KTBN Salt Lk City UT: Myles Munroe. See M 0630.

- 2333 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 2345 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.

Fridays

- 2300 USA, KTBN Salt Lk City UT: Praise the Lord. See S 0400.
 2300 USA, WBCQ Monticello ME: Financial Survival.
 2310 Bulgaria, Radio, Radio: Events and Development. See T 1110.
 2325 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.
 2335 Bulgaria, Radio, Radio: Timeout for Music. See S 0235.
 2345 Bulgaria, Radio, Radio: Radio Bulgaria Calling. See S 0245.

Saturdays

- 2300 Bulgaria, Radio, Radio: News. See S 0200.
 2300 USA, KTBN Salt Lk City UT: The Coral Ridge Hour. See S 1500.
 2300 USA, WBCQ Monticello ME: Brenda Farley.
 2310 Bulgaria, Radio, Radio: News Behind the News. See S 0210.
 2325 Bulgaria, Radio, Radio: Keyword Bulgaria. See S 0225.
 2330 Netherlands, Radio: News. See S 0050.
 2330 USA, WBCQ Monticello ME: The Real Amateur Radio Show.
 2338 Netherlands, Radio: Europe Unzipped. See S 0103.
 2340 Bulgaria, Radio, Radio: Answering Your Letters. See S 2340.
 2354 Netherlands, Radio: Insight. See S 0454.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

John Babbis, Silver Springs, MD; Dan Elysea/WYFR; Glenn Hauser, Enid, OK/*World of Radio*, *DX Report*, Hans Johnson, AZ/Ulis Fleming, MD/*Cumbre DX/DXing With Cumbre*; Al Quaglieri/*NASWA Journal*; George Woods/*Media Scan*; Giovanni Serra/*The Four Winds*; BBCM; *BBC On-Air*; Harold Sellers, *DX Ontario*; *Gatflash!*; *Hard Core DX*; *MARE*; Radio Sweden/*Media Scan*; Usenet Newsgroups; *Worldwide DX Club*.

How To Use This Table

The *Monitoring Times* propagation table is set up to cover three main areas of the continental US and similar circuits are calculated for each area. If you live in Canada or along the 49th parallel, and have access to the Internet, you can check the following sites for similar tables for the Canadian and northern US users at <http://www.odxa.on.ca/rac2txt99.htm>.

In the *MT* tables and on the Canadian web site, the OWF (Optimum Working Frequency) frequency for a particular circuit is displayed. This frequency should give you the best chance, 90% of the time, to hear a station located at the other end of the circuit. If you feel adventurous, look up higher than the OWF for possible signals.

The tabulated OWF is approximately equivalent to 80% of the MUF (Maximum Usable Frequency) so you could still go up in frequency in your search for a signal. For example, if the tabulated OWF is 8.0 MHz, the MUF would be 10 MHz, so you could go lurking in the upper reaches up to 10 MHz. When you reach the MUF, your chances of hearing a good signal have now decreased to about 10%. When the solar activity is high you might find some of the MUF in the 35 to 45 MHz area; you never know what you can find "up there."

The OWF can, at times, have a calculated value of "0". This value is replaced by an asterisk (*) and the cells are shaded in the *Monitoring Times* chart and on the Web pages. When you see this, do not despair; keep on looking in the vicinity of the last frequency listed for that circuit. The reason why the OWF can have a calculated value of "0" is simply that the ALF (Absorption Frequency) on this circuit, at that particular time of day, is higher than the OWF and, in theory, communication at the OWF should be impossible. But I have been in the radio field long enough to know that theory and practice do not always agree!

As it is relatively safe to assume reciprocity in the forecasts most of the time, the *MT* circuits are labeled "TO/FROM." There are some technical arguments against this assumption, but we know that the *MT* forecasts have been used with success by overseas listeners to listen to North American broadcasts.

A "P" after the name of a circuit indicates that the signal on that particular circuit can be influenced by auroral zone disturbances while traveling over the pole.

Enjoy DXing and use the propagation charts to help you locate unusual signals.

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 May 2000 to 14 June 2000 Flux=191 SSN=149

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
CARIBBEAN	17	17	18	17	15	14	12	12	12	11	10	10	11	12	14	16	17	18	18	19	19	18	17	16
SOUTH AMERICA	19	20	21	21	19	17	16	15	15	14	13	13	13	16	20	21	22	22	22	23	24	23	22	20
WESTERN EUROPE	12	12	11	11	10	11	12	11	*	*	*	*	*	*	14	16	17	17	18	18	17	16	15	14
EASTERN EUROPE (P)	12	12	12	13	13	15	14	*	*	*	*	*	*	*	14	15	16	17	17	17	16	15	*	13
NORTH AFRICA	19	17	17	16	16	16	14	13	*	*	*	*	*	*	16	17	18	19	19	19	19	19	19	19
CENTRAL AFRICA	19	20	20	19	18	16	13	13	*	*	*	*	*	*	17	18	20	21	21	21	21	21	20	19
SOUTH AFRICA	20	19	16	13	11	15	14	14	13	*	*	*	*	*	15	17	19	20	21	21	22	21	20	20
MIDDLE EAST (P)	15	16	17	20	19	17	15	*	*	*	*	*	*	*	15	17	18	20	20	20	19	18	18	16
CENTRAL ASIA (P)	19	20	20	21	20	18	17	14	*	*	*	*	*	11	12	13	15	16	17	17	17	16	15	16
INDIA (P)	19	19	20	20	20	19	17	*	*	*	*	*	*	10	11	12	15	17	19	20	21	20	18	17
THAILAND	20	20	20	21	21	20	18	16	14	13	12	12	11	11	12	14	17	18	20	21	20	18	17	20
AUSTRALIA	24	24	24	25	25	22	20	17	16	15	15	14	13	13	13	16	17	15	*	*	*	16	23	24
CHINA	20	20	20	21	21	19	18	16	14	12	12	11	11	11	12	14	16	17	16	15	15	16	18	20
JAPAN	19	19	19	19	19	17	16	14	13	12	11	11	10	10	11	13	15	14	13	15	18	19	19	19
SOUTH PACIFIC	22	22	22	22	21	19	17	15	15	14	14	12	11	11	12	15	14	17	20	21	22	23	23	23
TO/FROM US MIDWEST																								
CARIBBEAN	20	20	18	17	15	14	14	14	13	12	11	12	15	18	19	20	20	21	21	21	20	20	20	20
SOUTH AMERICA	23	24	23	22	20	19	19	19	17	16	15	16	20	24	25	26	26	26	27	27	26	26	25	24
WESTERN EUROPE	14	14	13	12	12	12	13	12	11	*	*	*	15	16	17	18	18	18	18	19	19	18	17	16
EASTERN EUROPE (P)	12	12	11	12	12	12	12	*	*	*	*	*	13	15	17	18	19	20	20	19	17	15	13	13
NORTH AFRICA	18	18	17	16	15	14	13	*	*	*	*	*	15	16	17	18	18	19	19	19	19	19	19	19
CENTRAL AFRICA	23	22	21	19	16	15	14	13	*	*	*	15	16	17	19	19	20	20	21	21	21	21	21	22
SOUTH AFRICA	22	19	15	13	10	14	16	15	14	*	*	15	17	18	20	21	21	22	22	21	21	21	21	22
MIDDLE EAST	16	16	17	18	16	14	13	*	*	*	*	*	15	16	17	18	19	19	19	19	19	19	19	17
CENTRAL ASIA (P)	18	20	19	18	17	15	*	*	*	*	*	12	14	15	16	17	18	18	18	17	17	15	15	15
INDIA	19	19	19	18	17	15	*	*	*	*	*	13	15	17	19	20	20	21	21	21	19	17	17	17
THAILAND	19	19	20	19	18	16	*	*	*	*	*	11	12	13	16	18	19	20	21	21	20	18	17	19
AUSTRALIA	22	22	23	22	20	18	16	15	14	14	13	12	12	13	15	17	17	15	*	*	*	16	21	22
CHINA (P)	19	20	20	19	18	16	14	*	*	*	11	11	12	14	16	17	17	17	17	16	15	16	18	19
JAPAN	19	19	20	20	18	16	14	13	12	11	11	10	11	12	14	16	15	15	14	16	18	19	19	19
SOUTH PACIFIC	23	23	24	22	19	17	16	15	15	15	13	13	12	14	18	16	16	20	22	23	24	24	24	23
TO/FROM US EAST COAST																								
CARIBBEAN	15	14	12	12	12	11	11	10	9	8	9	11	13	15	15	15	16	16	16	16	15	15	15	15
SOUTH AMERICA	21	22	21	21	21	20	20	18	16	14	15	19	23	25	25	25	25	24	24	24	24	24	23	21
WESTERN EUROPE	14	14	13	12	12	12	13	12	12	12	14	16	17	18	18	18	18	18	19	20	20	19	18	16
EASTERN EUROPE	12	12	11	11	12	13	12	11	*	*	*	14	16	17	18	19	19	19	19	19	17	15	14	13
NORTH AFRICA	18	17	17	16	15	14	14	13	*	*	14	16	17	18	19	20	20	20	20	20	20	19	18	18
CENTRAL AFRICA	23	21	19	18	17	16	15	14	14	14	17	18	20	20	21	21	21	21	22	23	22	22	23	23
SOUTH AFRICA	21	18	15	12	10	13	17	15	14	15	18	22	23	24	24	24	25	25	25	24	24	23	24	23
MIDDLE EAST	17	16	16	17	15	14	13	*	*	*	15	16	17	18	19	20	20	20	21	21	20	20	19	18
CENTRAL ASIA (P)	16	19	19	17	15	14	*	*	*	*	14	15	17	18	19	19	20	19	18	18	17	16	15	15
INDIA (P)	18	20	19	16	14	*	*	*	*	*	15	17	19	20	21	21	21	21	21	21	20	19	17	17
THAILAND (P)	21	20	19	17	15	*	*	*	*	*	14	16	18	19	20	21	21	21	21	21	20	18	17	19
AUSTRALIA	23	23	22	20	18	16	15	15	15	14	13	13	15	17	19	18	17	15	*	*	*	16	22	22
CHINA (P)	21	20	19	17	15	*	*	*	*	*	12	13	15	18	19	20	18	18	17	15	14	14	17	19
JAPAN	21	21	20	19	17	15	14	13	12	11	12	13	15	16	17	17	16	16	15	16	18	20	20	20
SOUTH PACIFIC	25	25	23	21	19	18	17	17	17	16	14	14	17	21	20	17	18	24	26	26	26	*	*	*

* Unfavorable conditions: Search around the last listed frequency for activity.

(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

Things Learned at the Shortwave Winterfest

The thirteenth annual *Winter Shortwave Listeners' Festival* was held March 10-11 in Kulpsville, Pennsylvania. Much of the discussion there centered around the future of shortwave radio, international broadcasting and its programming, as well as that of the hobbyist/listener clubs that, historically, have had such an important role in generating interest in all of this. Since the 150 or so attendees included several broadcasters and listeners hailing from seven countries, the views expressed can be said to be sufficiently broad and representative to allow the drawing of some useful, though tentative, conclusions.

1. Programmers still respond to listeners; technology does not dictate programming decisions.

I asked the VOA's Kim Elliott, producer and presenter of *Communications World*, if the fact that his program is now broadcast on local AM and FM stations and the Internet, as well as on shortwave, has caused him to change his approach to producing *CW*. His short answer was, "No."

He explained that the program has always sought to inform an international audience about developments in the field of communications in its broadest sense. While it is true that there are now more technologies to talk about, Elliott said, it is what is likely to interest the listener that guides him in the preparation of his program. This view was unanimously echoed by the other broadcasters in attendance. Of course, finding out what listeners really want can be quite a challenge (an issue which is further addressed later).

Technology can be an effective tool in the effort to enhance the listening experience, but it does not play a meaningful role in programming decisions.

2. The new technologies, in themselves, are much less of a factor right now than many people think.

Christina Rockstroh, Organizer of Foreign Language Programmes at *YLE Radio Finland*, explained that shortwave remains the primary means of delivering programs to an international audience. She gave a simple explanation for this: shortwave radios are relatively inexpensive, simple to operate and can be used anywhere. *Radio Finland* has a presence on the Internet, Ms. Rockstroh said, because *YLE* perceives the need to be in all places where listeners are apt to be. Nonetheless, only a small proportion of the station's budget is applied to accessing new delivery technologies compared to that spent on other things including shortwave transmission.

Elliott and several European listeners and hobbyists such as Risto Vahakainu, Director of the *European DX Council*, pointed out that unlimited high speed Internet access at a fixed monthly price with access via free local calls exists only in North America, making listening via the computer – either via live streaming or through downloading of archived programs – a cost-prohibitive exercise nearly everywhere else. Another prominent name in the international shortwave listening community, Victor Goonetilleke of Sri Lanka, reminded Festgoers in his Saturday luncheon address that a strong majority of people in the

world have yet to make their first telephone call, let alone experience a computer or the Internet!

3. The new technologies and shortwave are actually much more complementary in nature to, rather than competitive with, one another.

In his keynote address delivered at the Fest's Saturday night banquet, Andy Sennitt of *Radio Netherlands*, took pains to emphasize that his station – one of the world's most popular broadcasters – has no intention whatsoever of abandoning shortwave. Rather, he said, the goal of *Radio Netherlands* is to deploy all delivery technologies in ways which maximize the usefulness of each and increase the station's audience. The station perceives that this can be and is being accomplished by using and matching each delivery means to the preferences of each audience segment.

For *Radio Netherlands*, explained Sennitt, this means that the station no longer sees itself in the rather narrowly defined fields of radio, television or publishing. Rather, *RN* is a multimedia information provider utilizing audio, video and text to deliver programs via a full range of delivery methods. He pointed out that the Internet already permits *RN* to provide ancillary support material to programs which might not otherwise be possible due to time and other limitations inherent in using just one production mode.

To *Radio Netherlands*, the Internet is an emerging new media form that offers the possibility of coordinating the use of audio, video and text within an interactive environment and, thereby, producing a fully enhanced communications experience for programmer and recipient. In brief, the Internet may hold great promise, but it is still early in the game and there is much to be learned through trial and error. *RN* is determined to try.

4. The complacency exhibited both by the management of many stations and the listening community itself may be far more problematical for the future.


Frans Vossen of *Radio Vlaanderen Internationaal*, producer and presenter of the *Radio World* program, pointed out that local, internal issues within stations can work at cross-purposes with the effort to project a consistent image or message abroad. With international broadcasting less a priority than it once was, there are fewer re-

sources overall and less attention focused on securing strong and experienced management. Longtime staff and their views might be perceived by new managers as a drag on the effort to "modernize," in effect marginalizing resident experience and knowledge.

Listeners complain that stations don't answer their mail. Yet Vossen, Rockstroh, Sennitt and Elliott all agree that the single most important pieces of mail (e- and postal) arriving at their stations are those that include detailed listener comments about programming. They also continue to be the hardest kind of mail to generate. Much of what does come in still seeks a QSL card, which is of no help to the station or the program producer.

Listeners simply **must** move beyond traditional reception reporting and provide producers with thoughtful reviews and constructive criticism. Furthermore, if clubs are to restore and enhance their standing within both the broadcasting and listening communities, they must become more than mere repositories for logs and contest rules. A bridge must be built between listeners and stations and clubs would seem to be the natural link to both sides. But is it a role they are willing to fill?

Until June, good listening!



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Sundays

0000 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
 0021 Radio Exterior de Espana: "Radio Waves"
 0100 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 0110 HCJB (am): "DX Partyline"
 0115 Hungary, Radio Budapest: "Radio Budapest DX Blockbuster"
 0121 Radio Exterior de Espana: "Radio Waves"
 0130 Radio For Peace Intl: "Continent of Media"
 0130 Glenn Hauser via WRN1: "World of Radio"
 0136 Radio Havana Cuba: "DXers Unlimited"
 0145 WWCR #3 (Tennessee): "Ask WWCR"
 0200 Glenn Hauser via RFPI: "World of Radio"
 0230 Glenn Hauser via WWCR #3: "World of Radio"
 0245 Radio Bulgaria: "Radio Bulgaria Calling"
 0300 Kim Elliott via WWCR #3: "Communications World"
 0300 Radio Mexico Intl: "DXperience"
 0300 WWCR #3 (Tennessee): "Spectrum (live)"
 0323 Voice of Turkey: "The DX Corner" (biweekly)
 0330 Australia, Radio: "Feedback"
 0336 Radio Havana Cuba: "DXers Unlimited"
 0408 Vatican Radio: "On-the-Air"
 0410 HCJB (am): "DX Partyline"
 0430 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
 0521 Radio Exterior de Espana: "Radio Waves"
 0536 Radio Havana Cuba: "DXers Unlimited"
 0600 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
 0630 Glenn Hauser via WRN1: "World of Radio"
 0630 Glenn Hauser via WWCR #3: "World of Radio"
 0704 Belgium, R Vlaanderen Intl: "Radio World"
 0830 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 0838 Radio Korea: "Multiwave Feedback"
 0930 Radio For Peace Intl: "Continent of Media"
 0930 Italy (AWR): "Wavescan"
 1000 Kim Elliott via WRN1 to NAm (Internet): "Communications World"
 1000 KSDA (Guam): "Wavescan"
 1000 Glenn Hauser via RFPI: "World of Radio"
 1015 WWCR #3 (Tennessee): "Ask WWCR"
 1030 KSDA (Guam): "Wavescan"
 1030 Glenn Hauser via WRN1: "World of Radio"
 1038 Radio Korea: "Multiwave Feedback"
 1134 Belgium, R Vlaanderen Intl: "Radio World"
 1230 Italy (AWR): "Wavescan"
 1230 KSDA (Guam): "Wavescan"
 1300 Marie Lamb via KWHR (Angel 4): "DXing with Cumbre"
 1330 KSDA (Guam): "Wavescan"
 1335 Radio Canada Intl: "The Maple Leaf Mailbag"
 1338 Radio Korea: "Multiwave Feedback"
 1400 Kim Elliott via VOA (News Now): "Communications World"
 1430 Kim Elliott via Astra 1B to Eu (Satellite): "Communications World"
 1430 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
 1430 KSDA (Guam): "Wavescan"
 1431 World Radio Network (WRN1): "Radio World"
 1436 Canada, Radio Canada Intl: "The Maple Leaf Mailbag"
 1500 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
 1530 KSDA (Guam): "Wavescan"
 1600 KSDA (Guam): "Wavescan"
 1605 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 1637 Radio Canada Intl: "The Maple Leaf Mailbag"
 1638 Radio Korea: "Multiwave Feedback"
 1730 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 1730 KSDA (Guam): "Wavescan"
 1737 Belgium, R Vlaanderen Intl: "Radio World"
 1830 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
 1938 Radio Korea: "Multiwave Feedback"
 1945 BBC (west af): "Waveguide" (4)
 1945 BBC (west af): "Write On"
 2000 Kim Elliott via WBCQ: "Communications World"
 2105 Radio Korea: "Multiwave Feedback"
 2130 KSDA (Guam): "Wavescan"
 2131 Belgium, R Vlaanderen Intl: "Radio World"
 2137 Canada, Radio Canada Intl: "The Maple Leaf Mailbag"
 2200 WRMI (Florida): "Wavescan"

2208 Radio Korea: "Multiwave Feedback"
 2300 Radio Mexico Intl: "DXperience"
 2300 Glenn Hauser via RFPI: "World of Radio"

Mondays

0030 Glenn Hauser via WWCR #1: "World of Radio"
 0130 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
 0231 Canada, Radio Canada Intl: "The Maple Leaf Mailbag"
 0238 Radio Korea: "Multiwave Feedback"
 0300 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 0301 Belgium, R Vlaanderen Intl: "Radio World"
 0345 BBC (me): "Write On"
 0345 BBC (me): "Waveguide" (4)
 0407 Canada, Radio Canada Intl: "The Maple Leaf Mailbag"
 0445 WWCR #3 (Tennessee): "Ask WWCR"
 0500 Glenn Hauser via WWCR #1: "World of Radio"
 0630 Kim Elliott via WWCR #1: "Communications World"
 0700 WWCR #1 (Tennessee): "Spectrum (live)"
 0700 Glenn Hauser via RFPI: "World of Radio"
 0945 BBC (east af): "Waveguide" (4)
 0945 BBC (east af): "Write On"
 1040 All India Radio: "DX-ers Corner" (2/4)
 1500 Glenn Hauser via RFPI: "World of Radio"
 1545 KTWB (Guam): "Pacific DX Report"
 1840 All India Radio: "DX-ers Corner" (2/4)
 2130 All India Radio: "DX-ers Corner" (2/4)
 2135 Radio New Zealand Intl: "Mailbox" (biweekly)

Tuesdays

0900 KTWB (Guam): "Pacific DX Report"
 1100 Glenn Hauser via WWCR #1: "World of Radio"
 1355 FEBC (Philippines): "DX Dial"
 1900 Glenn Hauser via RFPI: "World of Radio"
 2000 Radio For Peace Intl: "Continent of Media"
 2000 Poland, Polish R Warsaw: "Polish Radio DX Club"
 2111 Radio Havana Cuba: "DXers Unlimited"
 2300 Radio Mexico Intl: "DXperience"
 2311 Radio Havana Cuba: "DXers Unlimited"
 2340 All India Radio: "DX-ers Corner" (2/4)

Wednesdays

0140 Radio Havana Cuba: "DXers Unlimited"
 0246 Radio Bulgaria: "Radio Bulgaria Calling"
 0300 Glenn Hauser via RFPI: "World of Radio"
 0340 Radio Havana Cuba: "DXers Unlimited"
 0400 Radio For Peace Intl: "Continent of Media"
 0540 Radio Havana Cuba: "DXers Unlimited"
 0630 HCJB (eu): "Ham Radio Today"
 0930 HCJB (pac): "Ham Radio Today"
 1030 Kim Elliott via WWCR #1: "Communications World"
 1100 Glenn Hauser via RFPI: "World of Radio"
 1200 Kim Elliott via WWCR #1: "Communications World"
 1200 Radio For Peace Intl: "Continent of Media"
 1315 FEBC (Philippines): "DX Dial"
 1720 Poland, Polish R Warsaw: "Polish Radio DX Club"
 1730 Radio For Peace Intl: "Continent of Media"
 1735 Radio New Zealand Intl: "Mailbox" (biweekly)
 1820 Argentina, RAE: "DX'ers Special"
 1930 HCJB (eu): "Ham Radio Today"
 2105 Hungary, Radio Budapest: "Radio Budapest DX Blockbuster"
 2130 Glenn Hauser via WBCQ: "World of Radio"

Thursdays

0030 Australia, Radio: "Media Report"
 0130 HCJB (am): "Ham Radio Today"
 0235 Hungary, Radio Budapest: "Radio Budapest DX Blockbuster"
 0239 Argentina, RAE: "DX'ers Special"
 0430 HCJB (am): "Ham Radio Today"

0800 KTWR (Guam): "Pacific DX Report"
 0930 Radio For Peace Intl: "Continent of Media"
 1008 Netherlands, Radio: "Media Network"
 1030 Australia, Radio: "Media Report"
 1130 World Radio Network (WRN1): "Media Report"
 1138 Netherlands, Radio: "Media Network"
 1220 Poland, Polish R Warsaw: "Polish Radio DX Club"
 1500 Radio Mexico Intl: "DXperience"
 1508 Netherlands, Radio: "Media Network"
 1530 Australia, Radio: "Media Report"
 1808 Netherlands, Radio: "Media Network"
 1938 Netherlands, Radio: "Media Network"
 2030 Glenn Hauser via WWCR #1: "World of Radio"
 2300 Glenn Hauser via RFPI: "World of Radio"

Fridays

0008 Netherlands, Radio: "Media Network"
 0508 Netherlands, Radio: "Media Network"
 0700 Glenn Hauser via RFPI: "World of Radio"
 0930 Glenn Hauser via WWCR #1: "World of Radio"
 1030 KTWR (Guam): "Pacific DX Report"
 1500 Glenn Hauser via RFPI: "World of Radio"
 1900 Radio For Peace Intl: "Continent of Media"
 1930 Radio New Zealand Intl: "Mailbox" (biweekly)
 1930 Glenn Hauser via RFPI: "World of Radio"
 1947 Radio Bulgaria: "Radio Bulgaria Calling"
 2000 WWCR #1 (Tennessee): "Ask WWCR"
 2030 Glenn Hauser via WBCQ: "World of Radio"
 2130 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 2238 Voice of Turkey: "The DX Corner" (biweekly)
 2330 Australia, Radio: "Media Report"
 2345 Radio Bulgaria: "Radio Bulgaria Calling"

Saturdays

0030 Australia, Radio: "Feedback"
 0100 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
 0132 Kim Elliott via VOA (News Now): "Communications World"
 0300 Radio For Peace Intl: "Continent of Media"
 0300 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
 0300 Glenn Hauser via WWCR #1: "World of Radio"
 0315 Voice of Turkey: "The DX Corner" (biweekly)
 0330 Glenn Hauser via RFPI: "World of Radio"
 0330 BBC (am): "Write On"
 0345 BBC (am): "Waveguide" (4)
 0345 BBC (south as): "Write On"
 0345 BBC (south as): "Waveguide" (4)
 0500 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
 0500 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
 0532 Kim Elliott via VOA (News Now): "Communications World"
 0600 Marie Lamb via KWHR (Angel 3): "DXing with Cumbre"
 0605 Australia, Radio: "Feedback"
 0610 HCJB (eu): "DX Partyline"
 0645 BBC (east af): "Write On"
 0645 BBC (east af): "Waveguide" (4)
 0645 BBC (me): "Write On"
 0645 BBC (me): "Waveguide" (4)
 0700 Kim Elliott via VOA (News Now): "Communications World"
 0730 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
 0730 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
 0745 BBC (eu): "Waveguide" (4)
 0745 BBC (eu): "Write On"
 0800 Kim Elliott via Astra 1B to Eu (Satellite): "Communications World"
 0830 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 0845 WWCR #3 (Tennessee): "Ask WWCR"
 0845 BBC (west af): "Waveguide" (4)
 0845 BBC (west af): "Write On"
 0910 HCJB (pac): "DX Partyline"
 0930 Marie Lamb via KWHR (Angel 4): "DXing with Cumbre"
 0932 Kim Elliott via VOA (News Now): "Communications World"
 1100 Radio For Peace Intl: "Continent of Media"

1130 Glenn Hauser via RFPI: "World of Radio"
 1130 Glenn Hauser via WWCR #1: "World of Radio"
 1145 Radio Bulgaria: "Radio Bulgaria Calling"
 1200 Glenn Hauser via WRN1: "World of Radio"
 1230 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"
 1245 Voice of Turkey: "The DX Corner" (biweekly)
 1315 WWCR #1 (Tennessee): "Ask WWCR"
 1332 Kim Elliott via VOA (News Now): "Communications World"
 1342 Radio Tashkent: "Radio Tashkent DX Program"
 1430 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
 1430 Marie Lamb via KWHR (Angel 4): "DXing with Cumbre"
 1455 FEBC (Philippines): "DX Dial"
 1730 Radio For Peace Intl: "Continent of Media"
 1736 Kim Elliott via VOA (News Now): "Communications World"
 1745 BBC (east as/pac): "Waveguide" (4)
 1745 BBC (east as/pac): "Write On"
 1800 Marie Lamb via WHRI (Angel 2): "DXing with Cumbre"
 1800 Glenn Hauser via RFPI: "World of Radio"
 1845 Voice of Turkey: "The DX Corner" (biweekly)
 1910 HCJB (eu): "DX Partyline"
 1930 Glenn Hauser via WWCR #3: "World of Radio"
 1958 Vatican Radio: "On-the-Air"
 2045 WWCR #3 (Tennessee): "Ask WWCR"
 2045 Voice of Turkey: "The DX Corner" (biweekly)
 2106 Radio Havana Cuba: "DXers Unlimited"
 2110 Australia, Radio: "Feedback"
 2130 Marie Lamb via WHRA (Angel 5): "DXing with Cumbre"
 2130 WRMI (Florida): "Wavescan"
 2131 Radio Exterior de Espana: "Radio Waves"
 2136 Kim Elliott via VOA (News Now): "Communications World"
 2147 Radio Bulgaria: "Radio Bulgaria Calling"
 2215 Voice of Turkey: "The DX Corner" (biweekly)
 2230 Marie Lamb via WHRI (Angel 1): "DXing with Cumbre"



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SATELLITE RADIO GUIDE



AUDIO SUBCARRIER GUIDE

By Robert Smathers, roberts@nmia.com

Audio frequencies in MHz. All satellite/transponder coordinates are C-band unless otherwise noted.

DS=Discrete Stereo

Classical Music

WCPE-FM (89.7) Raleigh/Durham/Chapel Hill, NC	G5, 7	5.58/6.12 (DS)
WFMT-FM (98.7) Chicago, IL—Fine Arts	G5, 7	6.30/6.48 (DS)
WQXR-FM (96.3) New York, NY	GE4, 14	6.20/6.80 (DS)

Satellite Computer Services

Superguide	G5, 7	5.48
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Contemporary Music

WPHZ-FM (96.9) Bremen, IN (South Bend market)	G11, 15	6.48, 7.30 (DS)
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Country Music

WSM-AM (650) Nashville, TN	C4, 24	7.38/7.56 (DS)
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Easy Listening Music

FCC mandated safe-harbor program audio-easy listening music	G3R, 9	6.80
	G5, 2	6.80
United Video—easy listening music	C4, 8	5.895 (N)

Foreign Language Programming

Antenna Radio (Greek)	GE4, 14	7.80
La Cadena CNN Radio Noticias (CNN Radio News in Spanish)	G5, 17	7.56
Radio Tropical	G7, 12	7.60
SRC AM Network	E2, 1	7.38
SRC FM Network	E2, 1	5.41/5.58 (DS)

Jazz Music

KLON-FM (88.1) Long Beach, CA., ID-Jazz-88	G5, 2	5.58/5.76 (DS)
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News and Information Programming

Broadcast News	E2, 1	5.78
Cable Radio Network	G5, 2	8.30
	G7, 6	7.30
	C1, 7	8.10
CNN Headline News	G5, 22	7.58
CNN Radio News	G5, 5	7.58
	G5, 5	6.30
	G5, 22	6.30
WCBS-AM (880) New York, NY—news	T4, 11	7.38

Religious Programming

Ambassador Inspirational Radio	GE3, 15	5.96, 6.48
Brother Staire Radio	G5, 6	6.48
KHCB-FM (105.7) Houston, TX	GE1, 9	7.28
KMUS-AM (1380), Muskogee, OK	G1R, 24	5.96
LDS Radio Network	C1, 6	5.58
Trinity Broadcasting radio service	G5, 3	5.58/5.78 (DS)

Shortwave Broadcasters via Satellite

C-SPAN Audio 1: Various shortwave broadcasters	C3, 7	5.20
C-SPAN Audio 2: British Broadcasting Corporation (BBC)	C3, 7	5.41
Deutsche Welle Radio 1	GE1, 22	7.38, 7.56 (DS) (German lang.)
Deutsche Welle Radio 2	GE1, 22	7.74 (English Language)
Deutsche Welle Radio 7	GE1, 22	7.92 (Various Languages)
RAI Satelradio Italy (Italian)	G7, 14	7.38

WEWN—Worldwide Catholic Radio, Vandiver, AL	G1R, 11	5.40, 7.38 (English) 5.58 (Spanish)
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WHRA Africa/Middle East—World Harvest Radio, South Bend, IN	G11, 15	7.82
WHRI Americas—World Harvest Radio, South Bend, IN	G11, 15	7.46
WHRI Europe—World Harvest Radio, South Bend, IN	G11, 15	7.55
KWHR Asia—World Harvest Radio, South Bend, IN	G11, 15	7.64
KWHR South Pacific—World Harvest Radio, South Bend, IN	G11, 15	7.73
World Radio Network: WRN1 North America	G5, 6	6.80
World Radio Network: WRN2 North America (Multi-lingual)	G5, 6	6.20

Specialty Formats

Colorado Talking Book Network	C1, 3	5.60
Weather Channel—background music	C3, 13	7.78
Wisdom Radio Network	GE1, 12	7.10
	GE1, 12	7.92
Yesterday USA—nostalgia radio	G5, 7	6.80

Talk Programming

American Freedom radio network	GE4, 19	5.80
Genesis Communications Radio Network	G1R, 17	5.58
Genesis Communications Radio Network	G9, 2	7.28
Republic Radio International	G7, 14	7.70
Talk America Radio Network #1—talk programs	GE3, 9	6.80
Talk America Radio Network #2—talk programs	GE3, 9	5.41
Talk Radio Network (TRN)	C1, 14	5.80
Truth Radio Network	G9, 2	5.40
TVRO.NET (featuring Keith Lamonica)	GE4, 16	5.80
United Broadcasting Network	C1, 2	7.50
WWTN-FM (99.7) Manchester, TN—news and talk	G5, 18	7.38, 7.56

Variety Programming

American Urban Radio Network	GE3, 9	6.30, 6.48 (DS)
CBM-FM (88.5) Montreal, PQ Canada—variety/fine arts	E2, 1	6.12
West Virginia Public Radio	GE1, 12	7.74
WNMX-FM (106.1) "Mix 106" Waxhaw, NC	G1R, 17	7.927

FM SQUARED (FM²) AUDIO GUIDE

GE-3 Transponder 13 (C-band)

Blank audio carriers .33, .51, .78, 1.05, 1.23, 1.41, 3.57, 3.75, 4.30, 4.47, 4.65, 4.83, 5.01, 5.20 MHz

Information Radio Network 3.39 MHz

Galaxy 3R Transponder 3 (Ku-band)

Blank Audio Carriers 2.06, and 3.14 MHz

Data transmissions .06, .62, 2.93, 3.07 and 3.17 MHz

AP Network News 3.53 MHz

In-Store audio network ads (various companies) .62, .71, .81, .88, 1.05, 1.15, 1.26, 3.25, 3.44, 3.62, 3.70, 3.80, 3.88, 3.97 and 4.20 MHz

Muzak Services .15, .27, .39, .51, .98, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, and 4.45 MHz

Galaxy 3R Transponder 16 (Ku-band)

Data transmissions .06, .64, 1.95, 2.18, 2.40, 2.52, 2.73, 2.82, 2.92, 3.20, 3.38, 3.47, 3.73, 3.97, 4.14, and 4.24 MHz

In-Store audio networks .15, .27, .39, .99, 1.11, 1.59, 1.71, and 1.83 MHz

Telstar 5 Transponder 28 (Ku-band)

Data Transmissions .06, .15, .23, .30, .35, .38, .47, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, 1.22, 1.35 MHz

SATELLITE RADIO GUIDE



SATELLITE LOADING REPORT OF THE MONTH:

Loral Skynet Telstar 4 at 89 degrees West longitude

C-band

1V Occasional video
2H Data Transmissions
3V SXTV Promo Channel
4H Data Transmissions
5V True Blue [V2+]
6H Occasional video
7V Gonzo X [V2+]
8H ABC - East [LEITCH]
9V Occasional video/Digital Video Horse Racing (occ)
10H CBS - West [LEITCH]
11V CBS - East [LEITCH]
12H Occasional video
13V CBS feeds [digital]
14H ABC - East [LEITCH] (occ) / ABC HDTV (occ)
15V X! Channel [V2+]
16H Eurotica [V2+]
17V Occasional video
18H PBS National Service
19V Extasy Promo Channel
20H Extasy [V2+]
21V ABC - West [LEITCH]
22H ABC - East [LEITCH]
23V Occasional video
24H 4 Media Company syndication feeds

Ku-band

Tr	Freq -Pol	Service
1	11730-V	South Carolina Educational TV [digital]
2	11743-H	Data Transmissions
3	11790-V	Data Transmissions
4	11803-H	Data Transmissions
5	11850-V	Data Transmissions
6	11863-H	Georgia Public TV [digital]
7	11910-V	Data Transmissions
8	11923-H	Data Transmissions
9	11971-V	Occasional video
10	11984-H	Occasional video
11	12033-V	Occasional video
12	12046-H	Occasional video
13	12095-V	Occasional video
14	12108-H	Louisiana Public TV [digital]
15	12157-V	DMX for Business [digital]/ Muslim TV Ahmadiyya [dig.]
16	12170-H	Occasional video

Panamsat Galaxy 7 at 91 degrees West long.

C-band

1H Warner Brothers [digital]
2V Occasional video
3H Action PPV [V2+]
4V 20th Century Fox Film Corp. [digital]
5H fX [digital]
6V Game Show Network [V2+]
7H Golf Channel [V2+]
8V Occasional video
9H Zmusic [digital]
10V Shop At Home

11H Encore [V2+]
12V Romance Classics [V2+]
13H TCI [digital]
14V Independent Film Channel [V2+]
15H Urban Ministries [digital]
16V Access Television [digital]
17H Toon Disney [digital]
18V Occasional video
19H Rarities Exchange [digital]
20V Fox News Channel [V2+]
21H BET on Jazz [V2+]
22V 20th Century Fox Film Corp [digital]
23H 20th Century Fox Film Corp [digital]
24V International Channel [digital]

Ku-band

1	11720-V	TCI HITS [digital]
2	11750-H	Data Transmissions
3	11750-V	Data Transmissions
4	11780-V	TCI HITS [digital]
5	11810-H	Data Transmissions
6	11810-V	TCI HITS [digital]
7	11840-V	TCI HITS [digital]
8	11870-H	Data Transmissions
9	11870-V	TCI HITS [digital]
10	11900-V	TCI HITS [digital]
11	11930-H	Primedia [digital]
12	11930-V	TCI HITS [digital]
13	11960-V	TCI HITS [digital]
14	11990-H	Occasional video
15	11990-V	TCI HITS [digital]
16	12020-V	Primedia [digital]
17	12050-H	Primedia [digital]
18	12050-V	Primedia [digital]
19	12080-V	TCI HITS [digital]
20	12110-H	Data Transmissions
21	12110-V	TCI HITS [digital]
22	12140-V	TCI HITS [digital]
23	12170-H	Data Transmissions
24	12170-V	Data Transmissions



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TVRO Time Machine: Yesterday USA Superstation

Many *MT* readers will remember the “Golden Age” of radio as that period in the 1930s and ‘40s, before TV, when radio was king. Many others of us grew up just as this era of radio was coming to an end but still had the chance to enjoy the remnants of this forgotten facet of the medium. The rest of our readers must wonder what all the fuss was about.

Even if you’re too young to remember anything older than *Imus In The Morning*, if you like the warm glow of antique radio dials, the comfort of genuine wood cabinets and that mellow sound from those old speakers and tube driven amps, you’ll like Yesterday USA Superstation.

YUSA is the brainchild of Bill Bragg, self-described as “the man with a million friends,” who founded The National Museum of Communications in 1979 and started YUSA four years later. Bragg, a broadcast engineer by trade, retired after 27 years at KDFW-TV in Dallas, Texas. Bragg says the purpose of YUSA is to be “...the official worldwide voice of the non-profit, tax exempt museum, and is on the air via satellite, cable TV and on the Internet. The station broadcasts public domain Old Time Radio shows and vintage music 24 hours a day, 7 days a week...”

YUSA is supported entirely by donations from listeners and is distributed without charge to cable systems across America and, since it broadcasts on Galaxy 5 channel 7, audio subcarrier 6.80 MHz, it’s free to anyone with a C-band satellite TV system.

◆ Slow Road to Success

In the last 16 years YUSA has turned up on the subcarriers of several different satellites before settling down on the Galaxy 5 home of WGN-TV Chicago. Throughout the period YUSA has slowly built a loyal following which provides the core of support needed to keep the signal on the air. And it’s from that growing fan base that all the work gets done. Bragg counts nearly 50 volunteers from all over North America who help make it all happen each week. According to Bragg no one receives a salary of any kind.

Throughout the years YUSA has been picked up by many cable-TV systems and low power

AM & FM radio stations. But, recently it’s been available on the Internet and has attracted quite a following. In a recent press release YUSA announced that it was the number two rated Internet radio station in America bringing in over 73,000 listeners in its monthly audience. Said Bragg, “...We are delighted but not necessarily surprised...We’re the only station in the world that airs vintage programming 24/7, and we’ve been at it now for over 15 years. It’s been a long time coming...” Indeed, it’s ironic that the nation’s newest technology would finally give YUSA the audience it sought all along for its vintage radio programming.



While YUSA is happy to get the new listeners, tens of thousands of regulars tune in daily via their C-band satellite systems to hear such fare as *The Jack Benny Show*, *The Shadow*, *Burns and Allen* and dozens more. In remarkably clear audio you’ll not only get the original shows as they aired live in the 30s and 40s but you’ll also hear the commercials and show credits. YUSA airs an incredible amount of programming including short-lived radio dramas you may never have heard of. There are also interviews with radio stars from the era and plenty of swing music from the original bands that invented the style which is back in vogue again.

During the evenings on Monday through Thursday Bill Bragg does a 90 minute live show on YUSA with vintage music and trivia. And on Sunday night Bill and two other YUSA regulars host a three hour program during which cable and satellite listeners can call in to trade Old Time Radio stories and Internet users can chat in real time via the YUSA web site chat room. The rest of the time YUSA airs a rotating schedule of vintage radio programming with names like *The Crystal Set*, *Shows of Yesteryear*, *The*

Glowing Dial, *The Music Museum*, *Old Time Radio Lives* and *Radio Rides Again*.

Just as with prime-time TV programming today, not all shows are classics. But, even by today’s jaded standards, some of the dramas seem as relevant now as they did half a century ago. Even the comedies, which can sound clichéd, just as often get real laughs from contemporary listeners. You’d have to be pretty cynical not to enjoy a well done routine by Burns and Allen. Some of the best material just doesn’t seem to age.

◆ How You Can Tune In

While the Internet provides access to YUSA programming, listening that way does have its drawbacks. But, thanks to satellite TV technology you can listen to YUSA anytime you like for as long as you like. In most areas of the U.S. you can receive C-band programming on dishes as small as 4.5’ with at least a 17 degree K LNB and an analog receiver. Regions on the coasts, South Florida and the northern tier of states will need larger dishes for best reception.

The best part is that setting up a dedicated system just for Galaxy 5 is relatively cheap. In fact, it might actually be free. Many C-band dish viewers are giving up their systems and succumbing to the temptations of the small dish. Their loss is your gain. Many are willing to give away the systems just to get rid of them. But, if you’re not lucky enough to have a neighbor so inclined you’ll find prices for used C-band systems very attractive. Most dealers have several systems which they’ve taken in trade for new DBS installs and are happy to sell them. These systems usually include already assembled dishes. (A great savings of time for you!) But, you’d better check around. Some dealers have an inflated view of the worth of their surplus C-band systems. Make an offer.

If you don’t have neighbors giving away systems or dealers selling them, you can still put together an inexpensive analog C-band system through www.smallear.com. This is one of the few places you’ll find which are still selling new, in-the-box, with warranty, analog receivers. The Jonsa 4.5’ dish with an analog receiver will do an adequate job, but, better results in most areas will be had with a 6’ dish.

◆ G5 Audio Bonanza

In the June and September 1998 issues of the now extinct *Satellite Times*, I wrote about "The Poor Man's DBS System." The idea was to set up a dedicated small dish C-band system which was not motorized, used an LNBF (no polarity switching motor), and was set up on one satellite. Which satellite it was dedicated to would depend on the interests of the user. For example, setting it up on Anik E2 is a great idea if you're interested in Canadian TV and radio programming. (Or are a big hockey fan!) You can set it up on GE2 for NASA-TV. But, for full time satellite radio fun set your dish on Galaxy 5 for YUSA's audio feed.

But, wait, there's more! Also on G5 you'll be able to listen to KILON-FM (Jazz from Long Beach, CA); WCPE-FM (classical music and BBC World Service news from North Carolina); WFMT-FM (classical music from Chicago); Cable Radio Network (which has a remarkable line-up of programming); World Radio Network 1 (the English version which broadcasts programs from the world's top short wave broadcasters); World Radio Network 2 (the foreign language version which broadcasts many of the same broadcasters in their native languages); CNN Radio News; CNN Radio Noticias (Spanish); CNN Radio and WWTN-FM (talk radio from Tennessee).

The variety of programming on G5 is extremely wide and while there are only three video services which are not scrambled (Trinity Broadcasting Network, Infomercia TV and Knowledge TV), the audio services alone are worth setting up a dedicated dish.

◆ What to Look for in a Receiver

You don't need a receiver with all the bells and whistles (you're just trying to listen to the radio!) but there are a few things to look for. You need to be able to tune the audio subcarriers from the front panel of the receiver. Most new satellite receivers do all the tuning on-screen, but, in many cases the wavy image of a scrambled channel makes seeing the on-screen graphics difficult and tuning impossible. Some models blank the screen and allow tuning regardless of what's on the screen.

Look for a stereo receiver. Though it doesn't make any difference on YUSA, you will really appreciate the stereo capability when tuning the classical music and jazz channels available on Galaxy 5. Older analog receivers had separate controls for left and right channels and were tunable from the front panel. Look for a "noise reduction" button. When using a very small dish, such as the 4.5' Jonsa, there may be a certain amount of noise in the signal. A noise reduction circuit may eliminate the noise or at least reduce it to a tolerable level.

Look for a signal strength meter. Most older satellite receivers had them built in, but, later models scrapped them in favor of a more streamlined look. With a dedicated dish it really helps to be able to see the signal strength even if it's just a string of LEDs and not an actual meter. This is most useful when setting up the dish, but also helps in keeping it peaked.

It's nice to have a remote control, but it's not crucial. The old General Instrument 1000 that I use lost its remote by the time I got it. Regardless, I can use the button pad on top of the receiver and look at the display on the front. Many newer receivers can't be operated except by remote.



It's ironic that the nation's newest technology would finally give Bill Bragg's YUSA the audience it sought all along for its vintage radio programming.

Setting up for YUSA Old Time Radio thrills is a good and cheap way to introduce yourself to satellite technology. So, have some fun, learn a few things then sit back and enjoy reliving the Golden Age of Radio. You'll wonder why you hadn't done it before!

Audio services on Galaxy 5

KILON-FM (Long Beach, CA)
Cable Radio Network (variety music & talk)
CNN Radio News
Trinity Broadcasting (Radio)
Brother Stair (religious)
World Radio Network 1
World Radio Network 2
WCPE-FM (North Carolina)
WFMT-FM (Chicago)
Yesterday USA Superstation
CNN Radio Noticias (Spanish)
WWTN-FM (Tennessee)
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Sources for more information

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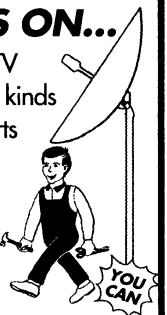
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Spring Weather, Space Weather

As I write this, it's already spring-like outside, though far too cloudy for my liking. I have been antenna fault-finding on my elderly crossed dipole that was brought down from the roof after failing a year or so ago. Despite its solid appearance, the sealed joint that connects the antenna's downlead to the cable carrying the signal to the receiver had let in salty rain, allowing the cable's inner core and braid to corrode. After paring it back a few centimeters, I found that the metal was clean, so I replaced the connector and all was well. Back on the test mast (washing line supporting a metal pole) the signals from NOAA-14 came in loud and clear on 137.62 MHz.

Before the WXSAT antenna went on the "test" mast, I had the log periodic mounted there. Is it not amazing how many signals there are to monitor in the 137 MHz band? I have logged and identified almost all of those received, but there is still one outstanding frequency – 136.80 MHz – that does not match the expected transmission times of Secor-13. I suppose it may turn out to be of terrestrial origin – rather like the case of Mars Polar Lander!

◆ Operational WXSATs

Meteor 3-5 is due back on (137.30 MHz) around March 18; by that time its orbital plane will have moved further from the terminator region (morning/evening twilight). Meteor 3-5 will be on north-bound passes just west of the evening twilight region, but will rapidly precess into afternoon sunshine.

Resurs 01-N4 has continued transmissions on 137.85 MHz in its essentially sun-synchronous orbit, providing automatic picture transmission (APT) during the sunlight portions of each pass. I find it quite curious hearing it commence transmissions each evening, near the end of each late-night, north-bound pass. The images are blank, of course.

Until mid-September, NOAAs-14 and 15 remain the only other APT WXSATs in regular operation. NOAA-12 is scheduled to resume transmissions at that time. With spring under way, NOAA-14's visible-light images are rapidly improving – see figure 1. Although this image has been enhanced (contrast expanded), the level of illumination has actually improved significantly.

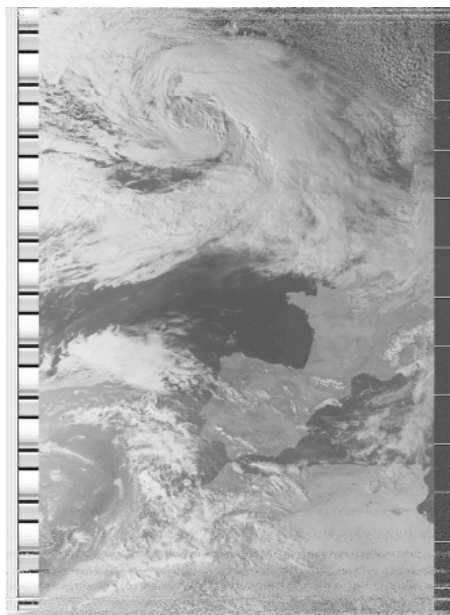


Fig 1: NOAA-14 1544 UTC March 7, 2000
There appears to be considerable evidence that NOAA-9 has been occasionally transmitting a non-APT signal on 137.50 MHz that has caused interference with the reception of NOAA-15. For a most interesting analysis of the transmissions, visit Martin Ellis's web page at: www.weather.cwc.net/noaa/noaa9.htm

◆ Sich-1 an experience!

Another surprise for European monitors has been the regular transmission of images from Sich-1 on 137.40 MHz. The real surprise has been that the transmissions have occurred during high elevation passes – not merely eastern ones over Russia. The signal appears weak, and has not included radar. For several days in early March, we have had transmissions on successive passes, including near-overhead ones lasting several minutes. This is quite unprecedented in my experience.

◆ Solar interference to reception

If you have an interest in astronomy (and I plead guilty to this) you may be aware that the sun is rapidly approaching the peak of its current 11-year sunspot cycle. At such times, and often also during times of minimum activity, the sun emits bursts of radiation across a wide part of the radio spectrum.

Many people with an interest in radio astronomy have built a total-energy radio telescope to monitor solar radiation at 150 MHz. Many years ago I used radio telescopes at much higher frequencies, and it was always astonishing to realize the extent of the sun's radio output right across the spectrum, from low frequencies through to the millimeter region.

It's hardly surprising then that many people have reported receiving several passes from the WXSATs – in the 137 MHz band – suffering severe interference. The problem is essentially a short-lived one, caused by the extra bursts of solar radiation and exacerbated by the need to use low-gain antennae. Directional antennae should overcome this problem due to the higher gain.

Good guides to "real-time" solar activity can be found from the following web sites:

Aurora information: uvisun.msfc.nasa.gov/UVI/current_image.html

NASA's science news and information about the Sun-Earth environment:

www.spaceweather.com/

◆ WXSAT education outreach program (EXPLORES!)

Paul Ruscher (ruscher@met.fsu.edu) of Tallahassee, Florida, tells me that EXPLORES! is once again soliciting applications for in-state (Florida) and out of state participants in the EXPLORES! program. For Florida teachers, all costs are paid by the program, and for out of state teachers, additional local support from the district/school will be required. He asks those interested to visit their WWW site at: www.met.fsu.edu/explores/ for more information, or go directly to their application site at www.met.fsu.edu/explores/app2000.html

◆ Contrails in Alaska

Another amazing image came from Dick Mobley in Anchorage, Alaska. With what must have been acute eyes, he noticed a contrail on a high resolution (HRPT) image from a NOAA-14 pass on February 14, 2000. On the left side of the image, a jet contrail and its shadow on a low cloud layer can clearly be seen. Near the center of the coastline is Malaspina Glacier, which is about 60 miles across. South of the glacier is Yakutat Bay, and the smaller bay to

the north of the glacier is Icy Bay. Dick comments that he has seen many contrails, but this seems to be one of the best to date. Dick first noticed the dark line of the shadow on channel 1. Zooming in revealed the contrail itself.

The color image is a composite of the two visual and three infrared channels and created using Timestep's HRPT software.

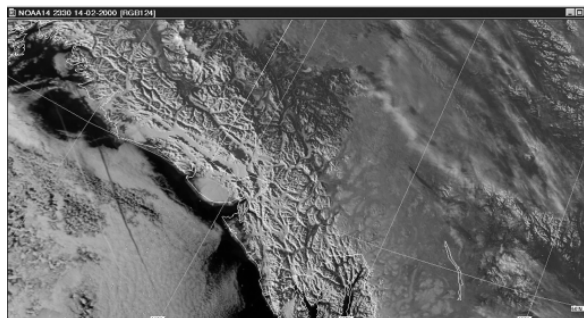


Fig 2: NOAA-14 2330 UTC February 14, 2000, pass from Dick Mobley

◆ GOES-L launch imminent

The next spacecraft in the GOES series – GOES-L – is currently scheduled for launch on May 3, 2000. GOES-L was originally delayed following various problems including launch vehicle issues. There were further delays, apparently due to lack of a pad availability to re-schedule the launch. The NOAA-L satellite has always been on schedule to be ready for the original launch date, but higher priority launches have been slipping in time, resulting in the uncertainty in a final launch date assignment for NOAA-L. My thanks to Steve Arnett of NOAA/NESDIS, for this information.

SPACECRAFT	LAUNCH READINESS DATE	ON-ORBIT	SPACECRAFT CONTRACTOR
GOES-I	04/13/94	GOES-8	SSL
GOES-J	05/23/95	GOES-9	SSL
GOES-K	04/25/97	GOES-10	SSL
GOES-L	05/03/00		SSL
GOES-M	10/2000		SSL
GOES-N	10/2002		HUGHES
GOES-O	04/2004		HUGHES
GOES-P	04/2006		HUGHES
GOES-Q	04/2008		HUGHES

Fig 3: GOES launch schedule – to 2008 inclusive

GOES I-M represents “the next generation” of meteorological satellites that introduced two new features. The first feature – flexible scan – provides small-scale area imaging that lets meteorologists take pictures of local weather trouble spots, allowing them to improve short-term fore-

casts over these areas. The second feature – simultaneous and independent imaging and sounding – is designed to allow weather forecasters to use multiple measurements of weather phenomena to increase the accuracy of their forecasts.

◆ From the archives

My first experience of high resolution Primary Data images from the European geostationary WXSAT Meteosat also gave me my first opportunity to see high quality pictures from a GOES satellite. I had just taken delivery of the first PDUS (Primary Data User Station) system manufactured by the British company Timestep Weather Systems, and manager Dave Cawley was keen to ensure that it worked “out-of-the-box,” so delivered it in person – from Cambridge (UK) to Plymouth! The system comprises a low-noise,

high gain preamp, feeding a 1691 MHz receiver; decoding is done via an interface board that fits an ISA slot in the computer. The antenna was a 1.6m dish, though this has been replaced by a 1.8m dish because the original one was damaged beyond squeezing back into shape during the 1987 hurricane that blew through Plymouth.

At that time, my computer was a ‘286, that is, its processor was an original 80286, and, if my memory serves me correctly for such intimate details, ran at about 12 MHz! This was almost state-of-the-art here in 1993, so no smirks, thank you! Talking of memory, this MSDOS operating system had 1Mb RAM!

When such high quality pictures are still a novelty, there is a reluctance to erase them. I am glad that I retained a few, despite the cost at that time of doing so. I saved several raw images on 5.25-inch floppies. (I said, no smirks!) None of my computers currently have a 5.25-inch floppy drive, but before that original computer was disposed of, I extracted its 5.25-inch drive to enable me to sometime get at those files. That time arrived this January when I decided to see what could be retrieved.

Figure 4 was one of the first files to be reprocessed. I have no record of the significance of the date – May 10, 1993 – so the weather systems may be quite typical, or there may have been a reason for my wanting to keep this image. If anyone knows of any significance of this date, do drop me an e-mail!

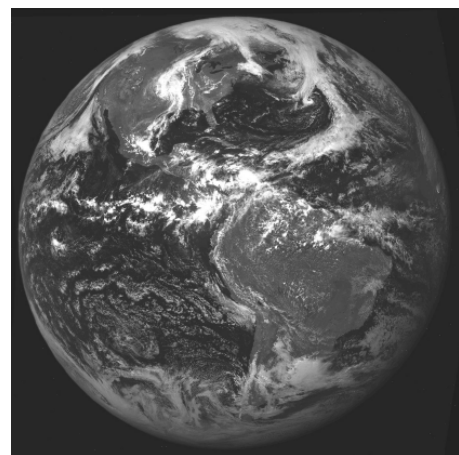


Fig 4: GOES-E visible-light image from May 10, 1993

◆ Frequencies

NOAA-14 transmits APT on 137.62 MHz
 NOAA-15 transmits APT on 137.50 MHz
 NOAA's transmit beacon data on 137.77 or 136.77 MHz
 Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
 Resurs 1-4 transmits APT on 137.85 MHz
 Okean-4 and Sich-1 may transmit APT briefly on 137.40 MHz
 GOES-8 and GOES-10 use 1691 MHz for WEFAX

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International Boundary and Water Commission

Ask any Arizona, California or Texas scanner enthusiast what they know about the IBWC and you will probably get a blank stare. But this important federal agency has an extensive VHF/UHF radio communications system along the US/Mexico border in the federal frequency bands which can be heard on conventional hobby scanners.

IBWC stands for the International Boundary and Water Commission and the mission of the IBWC is to apply the rights and obligations which the Governments of the United States and Mexico assume under the numerous boundary and water treaties and related agreements, and to do so in a way that benefits the social and economic welfare of the peoples on the two sides of the boundary and improves relations between the two countries.

As provided for in treaties and agreements, those rights and obligations include: distribution between the two countries of the waters of the Rio Grande and of the Colorado River; regulation and conservation of the waters of the Rio Grande for their use by the two countries by joint construction, operation and maintenance of international storage dams and reservoirs and plants for generating hydroelectric energy at the dams; regulation of the Colorado River waters allocated to Mexico; protection of lands along the river from floods by levee and flood way projects; solution of border sanitation and other border water quality problems; preservation of the Rio Grande and Colorado River as the international boundary; and demarcation of the land boundary.

As established by Treaties in 1848 and 1853 the international boundary between the United States and Mexico extends over 1,952 miles (3,141 km), exclusive of the maritime boundaries. The boundary follows the middle of the Rio Grande from its mouth on the Gulf of Mexico a distance of 1,254 miles (2,019 km) to a point just upstream of El Paso, Texas, and Ciudad Juárez, Chihuahua; then it follows an alignment westward overland and marked by monuments a distance of 533 miles (858 km) to the Colorado River; thence it follows the middle of that river northward a distance of 24 miles (38 km); and then it again follows an alignment westward overland and marked by monuments a distance of 141 miles (226 km) to the Pacific Ocean.

The Convention of 1889 creating the International Boundary Commission (IBC), and the 1944 Water Treaty which changed its name to the International Boundary and Water Commission, both provide that it shall consist of a United States Section and a Mexican Section. The 1944 Treaty further provides that it shall in all respects have the status of an international body, that the head of each Section must be an Engineer Commissioner and

that, wherever Treaty provisions call for joint action or joint agreement by the two Governments, such matters shall be handled by or through the Department of State of the United States and the Secretariat of Foreign Relations of Mexico.

◆ Extensive Communications

Below is a detailed look at the extensive communications system that has been put into place by the IBWC.

IBWC survey crews have been monitored in the past using two federal government low power itinerant frequencies: 27.575 and 27.585 MHz.

The bulk of the IBWC communications system uses the 162-174 MHz federal band for its various repeater systems.



IBWC Texas

162.025/164.175	Amistad Dam/Comstock (Amistad Dam hydro project)
162.025/164.175	Falcon Dam/Harlingen (lower Rio Grande Valley flood control project)
162.175/164.175	Anzalduas Dam (lower Rio Grande Valley flood control project)
171.925/169.525	Comstock (Amistad Dam hydro project)
173.175/169.425	Anzalduas Dam/Borrego/Presidio (Lower Rio Grande Valley flood control project)
173.175/172.475	Caballo Mtn repeater (El Paso Rio Grande project office)
173.9625/172.400	Falcon Dam/Harlingen (lower Rio Grande Valley flood control project)

IBWC California

163.625	San Ysidro (part of the Tijuana River flood project)
164.475	San Ysidro (part of the Tijuana River flood project and shared with Yuma)
172.475	San Ysidro mobiles only

IBWC Arizona

164.475	Yuma Project Office (shared with the Bureau of Reclamation)
172.775/168.575	Telegraph Pass/Yuma (Yuma Project Office)

Monitors will also find some UHF links on: 411.650, 411.775, 412.050, 412.125, 412.175, 417.250, 417.675, 417.725, 417.775 and 417.875. These links are all located in Texas.

◆ Campaign 2000

With the election campaign in full swing, fed monitors in the Washington, DC area might want to keep an eye on the following House and Senate pager/simplex frequencies for interesting activity.

Senate

Democrats	171.175 and 406.800
Republicans	171.975 and 406.675
General communications	418.075 simplex

House

Democrats	169.575
Republicans	170.375
Officers of the House	409.100 and 409.600

One of the more popular tourist spots in Washington, DC, is the Smithsonian Institute and National Zoo. They have the following interesting radios nets scattered around the District area.

32.730	National Zoo parking lot operations
163.700	National Zoo paging system
169.000	Smithsonian watch tour reporting (F1)
169.150	Smithsonian watch tour reporting (F2)
169.050	Smithsonian motor pool simplex
169.200/169.375	Smithsonian security
169.625/166.5625	Smithsonian maintenance
169.725	National Zoo security
170.175/169.375	National Zoo Research Center security
408.400	National Zoo staff
409.025	Smithsonian special displays
409.775	Smithsonian special displays
418.075	Museums on the Mall maintenance

Also this month we continue our exploration of the VHF high government frequency band, started in the December 1998 issue of the *Fed Files*, by profiling the 172.0-172.9875 MHz range in Table 1. We will complete our look at this important frequency range in next month's *Fed Files* column. Then we will turn our attention to a portion of the spectrum which has a lot of skip action on it these days due to higher sunspot counts – the federal subbands in the 30-50 MHz spectrum range. Until next month, 73 and good hunting.

Table One: Federal Frequency Allocations: 172-172.9875 MHz

172.0000	Commerce Department, DEA (Nationwide), Federal Law Enforcement Training Center, Navy	Veterans Administration	Department, FBI, Interior Department (Nationwide), National Park Service, TVA
172.0125	(No reported activity)	172.3125 Forest Service (Nationwide)	172.5875 Interior Department (Nationwide)
172.0250	Bureau of Indian Affairs, Energy Department, Environmental Research Lab, Institute for Telecommunications Science (Nationwide), National Bureau of Standards, National Ocean Service, National Park Service, National Weather Service, TVA, Veterans Administration Army, NASA (Nationwide)	172.3250 Agriculture Department (Nationwide), Army, City of Los Angeles, FAA, FBI, Food Safety and Inspection Service, Forest Service, Geologic Survey, Soil Conservation Service	172.6000 Bureau of Indian Affairs, Bureau of Land Management, FBI, Fish and Wildlife Service, Interior Department (Nationwide), National Park Service
172.0375	Environmental Research lab (Nationwide), FAA, Institute for telecommunication Science (Nationwide), National Marine Fisheries Service (Nationwide)	172.33125 Forest Service (Nationwide)	172.6125 Interior Department (Nationwide)
172.0500	(No reported activity)	172.3375 Forest Service (Nationwide), NASA (Nationwide)	172.6250 Bureau of Indian Affairs, Bureau of Land Management, Bureau of Prisons, Bureau of Reclamation (Nationwide), Energy Department, FBI, Interior Department (Nationwide), National Park Service, TVA
172.0625	Census Bureau, Environmental Research Lab (Nationwide), FBI, Forest Service, Institute for Telecommunications Science (Nationwide), National Ocean Service (Nationwide), National Weather Service (No reported activity)	172.34375 Forest Service (Nationwide)	172.6500 Bureau of Reclamation, Energy Department, Fish and Wildlife Service, Interior Department (Nationwide), National Park Service, Navy, Social Security Administration, TVA
172.0750	(No reported activity)	172.3500 Agriculture Department (Nationwide), Agriculture Extension Service, Agriculture Research Service, Animal/Plant Health Inspection Service (Nationwide), Customs Service, Forest Service, Soil Conservation Service	172.6750 Bureau of Indian Affairs, Bureau of Reclamation, Federal Highway Administration, Fish and Wildlife Service, Interior Department (Nationwide), Mine Safety and Health Administration (Nationwide), National Park Service
172.0875	Bureau of Indian Affairs, Environmental Research Lab (Nationwide), FAA, Institute for Telecommunications Science (Nationwide), National Marine Fisheries Service (Nationwide), National Weather Service	172.3625 Forest Service (Nationwide)	172.6875 (No reported activity)
172.1000	Interior Department (Nationwide)	172.3750 Agriculture Department (Nationwide), Agriculture Research Service, Bureau of Land Management, County of Los Angeles, Forest Service, Navy, Nuclear Regulatory Commission, Soil Conservation Service, State of Washington Forestry Service, Veterans Administration	172.7000 Bureau of Indian Affairs, Energy Department (Nationwide), Environmental Protection Agency (Nationwide), Railroad Transportation Test Center, State Department (Nationwide)
172.1225	Army, FAA (Nationwide)	172.3875 Forest Service (Nationwide)	172.7125 (No reported activity)
172.1375	Interior Department (Nationwide)	172.4000 Agriculture Department (Nationwide), Animal/Plant Health Inspection Service (Nationwide), Army, Bureau of Reclamation, Forest Service, Interior Department (Nationwide), International Boundary and Water Commission, National Park Service, Soil Conservation Service	172.7250 Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Energy Department, FAA, Fish and Wildlife Service, Interior Department (Nationwide), National Park Service
172.1500	FAA (Nationwide)	172.4125 (No reported activity)	172.7375 (No reported activity)
172.1625	(No reported activity)	172.4250 Bureau of Indian Affairs, Bureau of Reclamation, Energy Department, FBI, Fish and Wildlife Service, Forest Service, Interior Department (Nationwide), National Park Service, TVA, Veterans Administration	172.7500 Army, Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Geologic Survey, Interior Department (Nationwide), National Park Service, Navy, TVA
172.1750	FAA (Nationwide)	172.4375 Interior Department (Nationwide)	172.7625 (No reported activity)
172.1875	FAA	172.4500 Air Force, Bureau of Indian Affairs, Fish and Wildlife Service, Geologic Survey, Interior Department (Nationwide), National Park Service, TVA	172.7750 Bureau of Indian Affairs, Bureau of Land Management, Coast Guard, Energy Department, FBI, Fish and Wildlife Service, Interior Department (Nationwide), International Boundary and Water Commission, National Institute of Health, National Park Service
172.2000	DEA (Nationwide), Energy Department, FBI, Forest Service	172.4625 Interior Department (Nationwide)	172.7875 (No reported activity)
172.2125	(No reported activity)	172.4750 Energy Department, FBI, Fish and Wildlife Service, Interior Department (Nationwide), International Boundary and Water Commission, National Park Service	172.8000 FCC (Nationwide)
172.2250	Agriculture Department (Nationwide), Animal/Plant Health Inspection Service, FAA, Federal Reserve System, Forest Service, Geologic Survey, NASA, Soil Conservation Service, State of Alaska	172.4875 (No reported activity)	172.8125 FAA, Interior Department (Nationwide)
172.2375	Forest Service (Nationwide)	172.5000 Army, Bureau of Land Management, Energy Department, Federal Law Enforcement Training Center, Forest Service, Interior Department (Nationwide), National Park Service, Post Office	172.8250 Army, FAA (Nationwide), FBI, Railroad Transportation Test Center
172.2500	Agriculture Department (Nationwide), Animal/Plant Health Inspection Service (Nationwide), Bureau of Prisons, Forest Service	172.5125 Agriculture Department (Nationwide)	172.8375 (No reported activity)
172.2625	Animal/Plant Health Inspection Service, Forest Service	172.5250 Bureau of Indian Affairs, Bureau of Reclamation, Energy Department, FBI, Fish and Wildlife Service, Interior Department (Nationwide), National Park Service	172.8500 Animal/Plant Health Inspection Service, Bureau of Indian Affairs, FAA (Nationwide)
172.2750	Agriculture Department (Nationwide), Agriculture Extension Service, Agriculture Research Service, Animal/Plant Health Inspection Service, Bureau of Land Management, Bureau of the Mint, Food Safety and Inspection Service, Forest Service, Soil Conservation Service, State of Louisiana/Michigan/Pennsylvania/Tennessee/Virginia Forestry Services, State of Maryland Conservation Services	172.5375 (No reported activity)	172.8625 (No reported activity)
172.2875	Forest Service (Nationwide)	172.5500 Energy Department (Nationwide), Environmental Protection Agency (Nationwide)	172.8750 Army, Energy Department, FAA (Nationwide)
172.3000	Air Force, Army, Bureau of Indian Affairs, Coast Guard, Energy Department, FBI, Federal Law Enforcement Training Center, Fish and Wildlife Service, Forest Service, Labor Department, NASA, National Institute of Health, National Science Foundation, Navy, Post Office, Railroad Transportation Test Center.	172.5625 Air Force	172.8875 (No reported activity)
		172.5750 Bureau of Land Management, Bureau of Prisons, Bureau of Reclamation, Energy	172.9000 FAA (Nationwide)
			172.9125 FAA
			172.9250 Energy Department, FAA
			172.9375 (No reported activity)
			172.9500 Air Force, FAA
			172.9625 NASA (Nationwide)
			172.9750 Air Force, FAA
			172.9875 (No reported activity)

Logic Trunked Radio Systems

This month we continue our tour of different trunked radio systems with a look at Logic Trunked Radio (LTR). This protocol was developed in 1978 by the E.F. Johnson company and is still in use, primarily by private companies such as taxicabs, utilities, delivery trucks, and repair services. It is not very popular with public safety agencies, who typically operate either Motorola or EDACS trunked radio systems.

LTR operates differently than Motorola and EDACS in several ways.

◆ Decentralized operation

All mobile radios in a centralized trunking system must request service through a single control channel. Access requests are usually handled in sequential order, and this bottleneck may delay messages during periods of heavy use. More importantly, a dedicated control channel also removes one radio frequency from use as a voice channel. A five-channel Motorola system, for instance, would have one control channel and four voice channels.

LTR systems use a distributed method of access where service may be requested on any channel, and every channel may be used for voice communications. In a five-channel LTR system, all five channels can be used for voice traffic, making more efficient use of the assigned radio frequencies. Also, since each repeater operates more or less independently, if equipment associated with one repeater fails, all the others continue to operate normally.

LTR systems can have up to 20 repeaters, one repeater per channel, all of which must be located at a single site. The repeaters are physically interconnected by a data bus and share status information with each other. Each repeater can then transmit information about which channels are idle and which are busy, and which talkgroup is active on which channel.

LTR uses digital control signaling combined with analog voice transmissions. Each repeater continuously transmits information in a sub-audible data stream that rides below the voice information. A 150 Hz tone transfers data at 300 bits per second, but is not usually heard

since most scanners only pass audio signals between 300 Hz and 3000 Hz.

Because LTR mobile radios always know which channels are busy, they only transmit a request for service when a channel is idle. Other trunking systems allow their mobiles to attempt access even when every channel is full, further congesting the control channel.

LTR repeaters usually operate in transmission trunking mode, where the channel is used only for the duration of the transmission. When the user who is talking lets up on the push-to-talk switch, the repeater releases the channel and makes it available for other users. As the conversation progresses each transmission may appear on a different radio frequency, giving the impression that the conversation “hops” from one channel to another.

Under some circumstances a repeater may switch to message trunking and hold a channel open for the duration of a conversation. This is often done for telephone calls or other interconnected operations.

LTR Talkgroup Format

Area Code	Home Repeater	User ID
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Area Code: 0 or 1
Home Repeater: 01 to 20
User ID: 000 to 254

Even when in transmission trunking mode, some other trunking systems do not immediately release the channel after the user stops talking. The repeater is configured to hold the channel open for a second or two, giving the other members of the talkgroup an opportunity to respond. If the system is very busy and the channel is released right away, a second conversation may take the channel and a person trying to respond in the first conversation will not be able to answer, since all the channels would be in use. This “hang time” is rarely needed, but it increases the waiting time for other mobile radios to access the system. It also means scanner listeners may hear a moment of dead air or system noise after the conversation ends but before the repeater turns off, which usually prevents the receiver from resuming scanning.

◆ Mobile Identification

Each LTR mobile radio is assigned to one of the repeaters. Whenever a mobile radio is not involved in a call it is listening to its “home” repeater to keep track of idle channels and to know if anyone is calling it. Even though LTR mobile radios have the ability to make a call on any channel, they usually try their home repeater first.

Each repeater can be assigned as many as 250 identification codes. The combination of home repeater number and identification code is the “address” of a mobile radio. A typical five-repeater system could have as many as 1,250 separate addresses and the largest twenty-repeater system may have up to 5,000 addresses. An address may be assigned to an individual mobile radio and used as a unique identifier, or it may be used as a group identifier by assigning it to more than one mobile radio.

Each LTR system also has an “area code” which is usually included in the address. This value can be either 0 or 1, and is usually 0. If two LTR systems are operating close enough to interfere with each other, one system will be assigned area code 0 and the other will be assigned area code 1. Repeaters in area code 0 will ignore transmissions with an area code of 1, and vice versa. Mobile radios will also listen only to their assigned area code.

◆ Enhancements

LTR-Net is a follow-on protocol to the original LTR, providing users with additional features and functionality. The LTR-Net protocol allows multiple sites to interconnect, giving users the ability to dispatch and communicate across a much wider area. It also supports direct radio-to-radio communication, direct dialed telephone calls, and over-the-air radio reprogramming.

The LTR-Net protocol is compatible with the older LTR equipment. LTR radios can operate on an LTR-Net system, and LTR-Net radios can operate on LTR systems. A user with an LTR-Net radio can even be in the same talkgroup as an LTR radio user, and operate on the same channel.

In 1998 the first LTR-Net began operation in Des Moines, Iowa and Omaha, Nebraska to

serve customers in the construction and service industries. There is also an LTR-Net system operating in 800 MHz and 900 MHz on the Caribbean island of Puerto Rico, providing voice, data, credit card verification and even GPS position reporting to commercial customers.

E. F. Johnson also sells a different trunking system called Multi-Net, which is not compatible with LTR and is not readily decoded by scanner listeners.

◆ LTR decoding equipment

LTR has not been a priority for the TrunkTracking scanners made by Uniden, probably due to the lack of public safety organizations using this protocol. For the hobbyist there are a few other options.

Radio Shack has been selling the PRO-92 scanner since November of 1999. This 500-channel scanner, built by GRE in Japan, has built-in support for LTR systems as well as Motorola and EDACS. There have been a number of complaints about possible firmware bugs in this receiver, some of which are related to LTR. Many unhappy users have returned their radios to Radio Shack for a refund, although many happy users continue to report good results. It appears to depend largely on geographic location and the particular signal characteristics of the systems being monitored. It's rumored that GRE is working on some fixes for the reported problems, and a new version of firmware is in the works.

To check the firmware version of a PRO-92, press the "3" key while the scanner is powering up and showing "Welcome to Multi-System Trunking." My scanner reports "Version 1.00," so I'm sure I've got all of the reported bugs.

Optoelectronics, based in Ft. Lauderdale, Florida, offers two different products capable of handling LTR.

The OptoCom is a computer-controlled receiver that uses a personal computer to decode and follow LTR trunking signals. The software was written specifically for the OptoCom and is included with the receiver. It provides full trunk following for LTR and Motorola systems, as well as the ability to receive non-trunked radio signals.

The OptoTrakker is an add-on box that connects to a user-supplied communications receiver and is capable of decoding LTR as well as several types of tone-controlled squelch used in non-trunked systems. It also comes with personal computer software that provides complete trunk following for LTR and Motorola systems when used with a particular Icom or AOR receiver.

I'd be interested in hearing from readers who are using the OptoCom or OptoTrakker for LTR decoding, or who have other setups for listening to LTR transmissions.

◆ Finding LTR systems

LTR operations can be found in the 800

MHz and 900 MHz frequency bands, as well as some relatively new systems in UHF. Remember that 800 MHz trunking repeaters will transmit between 851 MHz and 869 MHz, so concentrate your efforts there.

LTR systems are not nearly as popular with scanner listeners as Motorola or even EDACS, and it is often very difficult to determine exactly who is using the system. Many LTR systems are owned and licensed to a private service provider. The provider, in turn, sells radios and airtime to many customers, each of whom usually has one or two talkgroups. For example, on a simple five-repeater system there may be private ambulance companies, taxicab operators, cable television repairmen, building inspectors, and local delivery trucks.

Chicago, Illinois

Midway Airport (MDW), while still perpetually under construction, is reported to have an LTR system running on the following frequencies: 476.3125, 476.5625, 476.7875, 477.4125, 477.6375, and 477.0875 MHz. Any reports from Chicagoland listeners would be welcome, especially to confirm whether the Chicago Police Department's Airport Law Enforcement Unit is using this system.

Bloomington, Indiana

Indiana University uses 854.7625, 855.0625, 856.8875, 857.8875, 858.8875, 859.8875, and 860.8875 MHz for their LTR system. Building maintenance and custodial services appear to be the heaviest users. So for all of you students exploring the steam tunnels, check these frequencies first!

Evansville, Indiana

At least one ambulance service is using this private system licensed to Mobiletel. Frequencies: 856.0625, 856.1875, 857.0625, 857.1875, 858.0625, 858.1875, 859.0625, 859.1875, 860.0625, and 860.1875 MHz.

Marshfield, Massachusetts

This seaside town south of Boston uses five frequencies: 453.4375, 453.5625, 453.5875, 453.6625, and 453.7625 MHz. Talkgroup 005000 is the Marshfield Harbormaster and the Fire Department uses 001010. Talkgroup 005020 is town-wide, used for simultaneously reaching the police department, fire department, and the harbormaster.

Rochester, New York

Genesee Business Radio Systems operates what amounts to two LTR systems. The systems overlap enough to require the use of the

area code digit to separate them. Time Warner, the local cable television provider, has been heard using talkgroups 002151, 002152, 003151, and 003152. Rochester Cab uses 019120 and 019100. Note that there may be more frequencies in use than what is listed here.

Area Code 0: 851.3375, 851.7375, 852.2375, 852.2875, 852.6875, 853.1375, 863.8875, 865.6875, 864.3375, 864.7875, 852.7125, 865.1875, and 865.6375 MHz.

Area Code 1: 865.9875, 865.9625, 865.7875, 864.1625, 865.0625, 865.3375, 864.8875, 864.6375, 864.6125, 864.4375, 864.1875, and 863.9875 MHz.

Milwaukee, Wisconsin

At least two private LTR systems operate in and around Milwaukee, each with a private ambulance company as a customer. One uses the frequencies 861.2875, 862.2875, 863.2875, 864.2875, and 865.2875 MHz. The other operates on 855.5875, 856.7875, 857.7875, 858.7875, 859.7875, and 860.7875 MHz.

That's all for this month. Keep those e-mails coming to dan@decodesystems.com, and check my website at www.decodesystems.com for more radio-related information. Perhaps I'll even see you at the Dayton HamVention! Until next month, happy monitoring!

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VHF-low bandplans from Europe

Italian 25-88 MHz Band Plan

Used with permission from Ciccio Munaron
All emissions in narrowband FM unless noted otherwise

26.200	Local Pagers (AM&FM)
26.350	Local Pagers (AM&FM)
26.500	Local Pagers (AM&FM)
29.650	Baby Monitors (Rare)
29.685	Baby Monitors
29.700	Baby Monitors
30.075-30.325	Base Cordless Phones outputs, 25 kHz steps (not approved by government)
30.850-30.950	Remote Control Doors, Band C has eight channels with 12.5 kHz steps
31.025-31.325	Base Cordless Phones outputs (inputs 39950-40225), 12.5 kHz steps (not approved by government)
39.950-40.225	Base Cordless Phones inputs (outputs 31025-31325), 12.5 kHz steps (not approved by government)
40.0125-40.0875	Local Pagers, 25 kHz steps
40.660-40.880	Model Aircraft Remote Control, 10 kHz steps
43.300-43.5875	Low Power Devices (base station cannot exceed 5 watts), 12.5 kHz steps which are divided as the following sub-bands:
43.300 (1), 43.3125 (2)	security and rescue, 43.325 (3) surveillance, 43.3375 (4), 43.350 (5), 43.3625 (6), 43.375 (7), 43.3875 (8), 43.400 (9) Commercial enterprises, 43.4125 (10), 43.425 (11), 43.4375 (12), 43.450 (13), 43.4625 (14) Yachts and marinas, 43.475 (15), 43.4875 (16), 43.500 (17), 43.5125 (18) Air clubs and sport aircrafts, 43.525 (19), 43.5375 (20), 43.550 (21), 43.5625 (22) Medical surveillance, 43.575 (23), 43.5875 (24)
46.020-49.980	Base Cordless Phones outputs, 30 kHz steps with many exceptions (not approved by government)
50.000-51.000	6-Meter Amateur Band assignment (all modes), 10 watts maximum power
53.750-60.750	Italian TV channel A (wideband FM), audio carrier on 59.250
52.000-70.000	FM Broadcast Network Relays, deregulated (wideband FM)
59.750-66.750	Italian TV channel B (wideband FM), audio carrier 65.250
68.000-73.000	Base Cordless Phones, inputs for 30 and 46 MHz band units, 10 kHz steps irregular (not approved by the government)
71.500	Alpine Rescue (Channel 1 input 68.750 and Channel 2 simplex)
71.525	Alpine Rescue (Channel 4 simplex)
71.550	Alpine Rescue (Channel 3 simplex)
72.080-72.140	Aircraft model remote control channels, 10 kHz steps

73.000-73.500	Fire Departments input and simplex, 40 channels using 12.5 kHz steps
73.500-74.000	Fire Departments output and simplex, 40 channels using 12.5 kHz steps
74.000-75.000	Base Cordless Phones outputs (not approved by government)
76.700-79.175	Police Department frequencies, 99 channels using 25 kHz steps
79.200-81.000	Frequency band not allocated, formerly used by surveillance devices
81.000-84.000	Base Cordless Phones outputs, rare (not approved by government)
82.750-89.750	Italian TV channel C, Torino only (wideband FM), audio carrier 88.250

France 26-87.5 MHz Bandplan

Courtesy of Ian Julian, New Zealand, and the VHF Skip Newsgroup

26.175-26.300	French Military/Fixed & Mobile
26.3125-26.475	Cordless Phones Base (41.3125-41.475 Handsets)
26.965-27.405	Citizen Band (narrowband FM)
27.500-28.000	Meteorological Aids/French Military(Marine Nationale)/Fixed & Mobile
28.000-29.700	10-Meter Amateur Band
29.700-30.000	French Military
30.005-30.010	French Military/Space
30.010-30.525	French Military
30.525-32.125	French Military/Private Mobile Radio
31.0375-31.2125	Cordless Phones Base (39.9375-40.1125 Handsets), new European allocation
32.125-32.600	French Military
32.600-33.000	French Military/Wireless Microphones
33.000-34.850	French Military
34.850-35.000	Private Mobile Radio Simplex
35.000-36.200	Private Mobile Radio (39.400-40.600 Duplex)
36.200-37.500	French Military/Wireless Microphones
37.500-38.250	Radio Astronomy/French Military
38.250-39.000	French Military
39.000-39.400	French Military/Wireless Microphones
39.400-40.600	Private Mobile Radio (35.000.36.200 Duplex)/French Military
39.9375-40.1125	Cordless Phones Handsets (31.0375-31.2125 Base), new European allocation
39.986-40.020	Space/French Military
40.600-40.660	French Military
40.660-40.700	Industrial, Scientific, and Medical (ISM)
40.700-40.980	French Military (Gendarmerie DIAMANT system)
40.980-41.000	Space
41.000-41.200	Remote Control
41.3125-41.475	Cordless Phones Handsets (26.3125-26.475 Base)
41.500-47.000	French Military (Gendarmerie)
49.000-57.000	Television channel F2, Sound 49.250 and Video 55.750
50.000-51.200	6-Meter Amateur Band

51.400-54.000	French Military
54.000-62.000	Television channel F3, Sound 54.000 and Video 60.500
57.000-65.000	Television channel F4, Sound 57.250 and Video 63.750
61.000-68.000	Private Mobile Radio
68.000-68.4625	French Military (Gendarmerie Maritime)
68.4625-69.250	Customs/Electricity de France/Ministry of Interior Mobile (72.5125-73.300 Base)
69.250-70.250	French Military
70.250-70.525	Private Mobile Radio Simplex
70.525-70.975	French Military
70.975-71.950	Private Mobile Radio Simplex
71.950-72.175	Ministry of Interior
72.175-72.5125	French Military
72.5125-73.300	Customs/Electricity de France/Ministry of Interior Base (68.4625-69.250 Mobile)
73.300-74.800	French Military (Gendarmerie SAPHIR system)
74.800-75.200	Instrument Landing System (ILS)
75.200-77.475	Private Mobile Radio/Taxis Mobile (80.300-82.475 Base)
77.475-78.000	French Military (Gendarmerie SAPHIR system)
78.000-80.000	French Military (Gendarmerie RUBIS TETRAPOL Digital radio system)
80.000-80.300	Private Mobile Radio Simplex
80.300-82.475	Private Mobile Radio/Taxis Base (75.200-77.475 Mobile)
82.475-83.000	French Military
83.000-83.600	Fire (Sapeurs Pompiers) Mobile (86.000-86.600 Base)
83.600-85.500	Police Nationale
86.000-86.600	Fire (Sapeurs Pompiers) Base (83.000-83.600 Mobile)
87.300-87.500	Pagers

United Kingdom CT1 Cordless Phone Bandplan

Courtesy of R.P. Gosnell (narrowband FM)
Analog/Digital cordless phones

Base	Handsets
1 31.0375	39.9375
2 31.0625	39.9625
3 31.0875	39.9875
4 31.1125	40.0125
5 31.1375	40.0375
6 31.1625	40.0625
7 31.1875	40.0875
8 31.2125	40.1125

That's it for this month. If you have a bandplan for a country other than the United States, we would like to publish that here. Use the snail mail address in the staff masthead or email larry@grove-ent.com. Till next month, good hunting.

Continental Airlines Cruisin'

Welcome aboard and fasten your seatbelts. Today, thanks to "Paul," an employee of Continental Airlines and also an *MT* subscriber, we are going to have a peek at their company station frequencies located around the country.

Hubs

Cleveland Hopkins International Airport (CLE), OH:

CAL (Continental Airlines) Ops - 129.925
CAL Ramp - 129.175
CAL Maintenance - 130.525
*Ice Man Control - 130.525
Continental Express (CALEX/COEX?) Ops - 131.200

Operations frequencies are for ground service requests as well as in-range calls; the ramp control freq is used for coordinating push-back and ramp traffic.

*The Ice Man gives de-ice information (line up/fluid type, etc.)

Newark (EWR), NJ:

Airborne (in-range) - 131.500
Ground Ops - 130.975/129.925 (gate dependent)
Maintenance - 131.225
Load Planning (for accuload information and changes in manifest) - 130.250
Ramp Control:
Terminal C Gates 70-99: 129.575
Terminal C Gates 100-121 (including the CALEX ramp) - 129.075

They also park some of their ORD (O'Hare Intl, Chicago, IL) and DFW (Dallas/Ft Worth Intl Airport, TX) bound aircraft on the "A" Concourse; those frequencies are 129.325 (American) and 129.550 (United).

De-ice Frequency - 130.525

Snowflake - 129.375 (this is someone from the chief pilot's office who inspects the aircraft by driving around it in a pickup truck. He checks for ice accumulation prior to departure and verifies the cleanliness of the airframe). Works great too!

Houston Intercont'l Airport (IAH), TX:

In-range - 129.300
Maintenance - 130.725
Load Planning - 130.900
Ramp Control Gates 1AB-1 thru 27 (North Ramp) - 130.825
Ramp Control Gates 29-48 (South Ramp) - 131.275

Various Airports-Out Stations

(AWA stands for America West Airlines, which handles some of Continental's ground services):
ABQ (Albuquerque Intl, NM) - 130.175 (AWA)

ATL (Hartsfield, Atlanta, GA) - 129.925
AUS (Robert Mueller Municipal, Austin, TX) - 129.925
BGR (Bangor Intl, ME) - 129.550
BNA (Nashville Intl, TN) - 130.525
BOS (Logan Intl, Boston, MA) - 130.400
BWI (Baltimore/Washington Intl, MD) - 130.525
CLT (Douglas Intl, Charlotte, NC) - 130.525
CVG (Covington/N Kentucky Intl, KY, serving Cincinnati, OH) - 130.525 (Also Continental Express - COEX)
DAY (Dayton Intl, OH) - 131.200
DCA (Ronald Reagan, Washington DC) - 130.400
DEN (Denver Intl, CO) - 129.925
DFW (Dallas-Ft. Worth Intl, TX) 129.925
DTW (Detroit Metropolitan, MI) - 130.025
ELP (El Paso Intl, TX) - 130.175
FLL (Hollywood Intl, Ft. Lauderdale, FL) - 130.525
GJT (Walter Field, Grand Junction, CO) - 129.950
GSO (Piedmont Triad Intl, Greensboro, NC) - 130.525
HRL (Harlingen Intl, TX) - 129.925
IND (Indianapolis Intl, IN) - 129.925
JAX (Jacksonville Intl, FL) - 130.525
LAX (Los Angeles Intl, CA) - 130.500
LFT (Lafayette Regional, LA) - 129.925
LGA (La Guardia, New York City, NY) - 130.400
MCI (Kansas City Intl, MO) - 129.925
MCO (Orlando Intl, FL) - 129.925
MDW (Midway, Chicago, IL) - 131.200
MDW (Midway, Chicago, IL) - 131.200
MEM (Memphis Intl, TN) - 131.200 (COEX)
MIA (Miami Intl, FL) - 129.925
MKE (Ben Mitchell Intl, Milwaukee, WI) - 131.500 (AWA)
MSY (New Orleans Intl, LA) - 129.925
OKC (Oklahoma City Intl, OK) 130.900
ONT (Ontario Intl, CA) - 130.175 (AWA)
ORD (O'Hare Intl, Chicago, IL) - 129.925
PHL (Philadelphia Intl, PA) - 129.925
PHX (Sky Harbor Intl, Phoenix, AZ) - 0.725 AWA/ 129.925
PIT (Greater Pittsburgh Intl, PA) - 130.525
RDU (Raleigh/Durham Intl, NC) - 130.525
RSW (SW Florida Regional, Ft. Meyers, FL) - 130.525
SAN (Lindbergh Field /San Diego Intl, CA) - 129.925
SAT (San Antonio Intl, TX) - 129.925
SDF (Standiford, Louisville, KY) - 130.525
SEA (Tacoma Intl, Seattle, WA) 129.925
SLC (Salt Lake City Intl, UT) - 130.175
SNA (John Wayne Airport, Santa Ana, CA) - 129.300
STL (Lambert, St. Louis, MO) 129.925

Many thanks, Paul! Our readers and I really appreciate these.

Correction

In the February issue, Mark Weymouth had contributed an article on NAVAIDs. In the 3rd to the last column, where the sentence read "Primary

radar information is received via the ASR (Aircraft Surveillance Radar) and sent to the DSC (digital scan converter) at the RACCON," it should have read "at the RAPCON, (Radar Approach CONtrol)!"

Sorry, Mark. That was unintentional.

Frequency Corner

A friend of mine who's a controller at ZMP (Minneapolis ARTCC) contributed the following frequencies to the column.

Approach Control:

Waterloo, IA - 118.900/251.150
Des Moines (East) - 123.900/307.150
Des Moines (West) - 135.200/360.700
Omaha (East) - 124.500/263.000
Omaha (West) - 120.100/363.800
Denver Center (ZDV)
Sector 19 - 132.700/397.850 Low
Sector 20 - 132.500/379.150 Low
Sector 31 - 127.950/338.200 High

Minneapolis Center (ZMP):

Sector 29 - 135.870/353.750 High
Sector 30 - 135.775/372.000 High
Sector 38 - 118.825/343.800 High
Sector 39 - 135.100/307.200 High
Sector 27 - 119.600/290.400 Low
Sector 27 - 125.650/288.100 Low
Sector 36 - 134.000/288.300 Low
Sector 37 - 124.100/269.000 Low
Sector 37 - 128.000/385.500 Low

Kansas City Center (ZKC):

Sector K40 - 132.600/370.900 Low
Sector K42 - 125.250/381.500 Low
Sector K46 - 127.900/251.100 Low
Sector K48/42 - 123.800/343.700 Low
Sector K66 - 134.900/363.200 Low
Sector K66 - 127.350/388.800 Low

Chicago Center (ZAU):

Sector G56 - 132.800/261.500 Low
Sector G56 - 118.150/354.100 Low
Sector G64 - 133.300/380.350 Low
Sector G60 - 121.375/263.000 High
Sector G75 - 127.775/343.600 High
Sector G61 - 132.225/327.800 Super High
Sector G76 - 125.225/285.500 Super High

That's all for this month! See you in June with more aero comms news and views. Until then, 73 and out.

Hill AFB Trunking System

One of the more interesting military bases around the country is Hill AFB in Utah. Among other claims to fame, Hill AFB is the address where several of the Janet aircraft are registered in official government records. Janet aircraft are the transport birds that ferry personnel from the Las Vegas McCarran International Airport to Groom Lake (aka Area 51, see my *Phantoms of the Desert* story online at the Grove website: <http://www.grove-ent.com/area51.html>).

In addition to writing our cover story for *MT* this month, Jon Van Allen also provided the *Milcom* column a nice profile on Hill AFB trunking system which is presented below.

Hill Air Force Base (KHIF)

Base Support Trunked Radio System (Motorola Type-II)

Base Frequency: 406.000

System ID: 6227

Frequencies:

406.150 406.750 407.250 (data channel)
407.525 408.025 408.550 408.950 409.150
409.750

Talkgroup IDs

8000 Maintenance Electricians
8032 Flightline Maintenance Specialist Dispatch
8640 Munitions
8672 Flightline Aircraft Maintenance, 421 TFS (A-4 aircraft) "Spiders"
8704 Flightline aircraft maintenance, AFMC
9280 Engineering, Building Maintenance
9770 Flight line operations
9792 Unknown
10240 Transportation
10720 Fire Department/Crash Crews
10816 Electronics Group
10880 Transportation/Deliveries
11040 Unknown
11104 Munitions
11456 Reference to "Phoenix-4" heard
11872 Transportation?
12000 Unknown
12064 Unknown
12800 Machinists "Wizard"
16416 Unknown
16480 Unknown
16512 Unknown

And from your editor's personal files here are some basic aeronautical frequencies used at Hill AFB.

419th Operations: 252.1
Clearance Delivery: 124.1 335.8
Ground Control: 121.6 275.8
Hill Command Post (ACC-Raymond 23/Others-Convoy): 381.3
Pilot to Dispatcher: 122.85 372.2
PMSV Metro: 375.2
Salt Lake City Approach: 121.1 124.9 126.0 126.8 135.5 290.3 301.5
307.2 316.7 381.2 389.8
Salt Lake City Departure: 121.1 124.9 126.8 290.3 301.5 381.2
Tower: 127.15 236.6 289.6

◆ Buckeye State Milair Report

Milcom regular Mike Fink passes along the following nice list of military air radio activity heard from Ohio.

Springfield-Beckley Municipal, Ohio (KSGH)

Ohio Air National Guard: 178 Fighter Wing/162 Fighter Squadron [OH (15) F-16C/D]

Known Callsigns: Buckeye, Kharma, Sabre, Shack (when traveling)

Air-to-Air Tactical: 138.050 138.275 138.450
138.750 139.625 (V8) 139.700 139.975
141.600 141.700 (V15?) 142.125 143.425
143.925

(UHF Command Post on 324.7 MHz-LVH)

Toledo Express Airport, Ohio (KTOL)

Ohio Air National Guard: 180 Fighter Wing/112 Fighter Squadron [OH (15) F-16C]

Known Callsigns: Hale, Sting, Loma (when traveling)

Automatic Terminal Information Service: 118.750 (V6)

Air-to-Air Tactical: 138.050 138.100 138.750
138.975 139.625 (V7) 139.675 (V8) 139.700
139.750 (V9) 139.875 139.975 (V8) 141.600
(V9) 143.850 (V10)

Beehive Command Post: 138.425 (V1)

Loma Command Post: 141.550

Rickenbacher International Airport, Ohio (KLCK)

Ohio Air National Guard: 121 Air Refueling Wing/145 and 166 Air Refueling Squadron [KC-135R]

Known Callsigns: Caesar (145 ARS), Sluff (145 ARS), Tazz (166 ARS)

139.875 and 143.825 Probable Air-to-Air Tactical
(In addition to Mike's list above be sure to watch the following: 138.10, 138.15, 138.40, 139.80 and 140.00 MHz for interplane activity. 166ARS command post on 297.1 MHz-LVH)

William Kellogg Airport/Battle Creek ANGB, Michigan (KBTL)

Michigan Air National Guard: 110 Fighter Wing/172 Fighter Squadron [BC A/OA-10A]

Known Callsigns: Freby, Hoss

110 Fighter Wing Command Post (Freby CP): 140.400

Air to-Air Tactical: 139.700 140.600
(267.8 is the UHF command post for the 110th FW-LVH)

Selfridge ANGB, Michigan (KMTG)

Michigan Air National Guard: 127 Fighter Wing/107 Fighter Squadron [MI F-16C/D Red Devils]

Known Callsigns: Bosen, Demon, Tajas (ACM missions), Yalta

Air-to-Air Tactical: 138.200 139.850 (V16)
142.200 (V17) 143.925 (V15)

Demom Operations (V1): 148.525

Unknown usage (Demons working Blacks here): 143.950 (This is a known Black Air-to-Air-LVH)

Fort Wayne International Airport (Baer Field), Indiana (KFWA)

Indiana Air National Guard: 122 Fighter Wing/163 Fighter Squadron [FW F-16C/D, C-26B]

Callsigns: Snake

Air-to-Air Tactical: 138.050 (V17) 138.200 (V19)
138.300 (V18) 138.475 139.700 139.750
(V16) 141.475 141.550

Snakepits Command Post/Operations: 138.400 (V1)

(122 FW UHF Air-to-Air has been reported on 257.9 and their command post on 289.3 MHz-LVH)

Hector International Airport, Fargo, North Dakota

North Dakota Air National Guard: 119 Fighter Wing/178 Fighter Squadron [F-16A/B, C-26B]

Callsigns: Nodak

Air-to-Air Tactical: 138.000 (V18) 138.025 (V4)
138.100 (V17) 138.950 (V16)
148.125

Miscellaneous Mike Fink Intercepts from Ohio

138.150 Scare (Might be the 69FS out of Moody that has used the Scare callsign and this freq for interplane operations in the past-LVH)
139.625 Timber callsign associated with a US Navy EA-6B (VAQ-142 based at NAS Whidbey Island-LVH)
139.875 Team Air-to-Air (This is a 305 AMW KC-10 from McGuire AFB-LVH)
139.900 Vipers Air-to-Air
140.400 Sniper A-10 Air-to-Air (Again the 69FS out of Moody uses this one-LVH)
141.550 Andrews AFB Command Post (I assume you didn't hear the ground station-LVH)

◆ Armed Forces Day 2000

Although Armed Forces Day will be celebrated on Saturday, May 20, 2000, the Secretary of Defense has designated May 13-21, 2000, as Armed Forces Week. The ARRL has reported that to avoid a conflict with Dayton Hamvention, the Army, Air Force, Navy, Marine Corps, and Coast Guard are co-sponsoring the annual amateur radio communications tests in celebration of the 50th Anniversary of Armed Forces Day on May 13-14, 2000.

This annual celebration features the traditional military to amateur crossband communications test and the Secretary of Defense message receiving test. These tests give amateur radio operators and short wave listeners an opportunity to demonstrate their individual technical skills and receive recognition from the Secretary of Defense or the appropriate military radio station for their proven expertise.

QSL cards will be provided to those making contact with the military stations and special commemorative certificates will be awarded to anyone who receives and accurately copies the digital Armed Forces Day message from the Secretary of Defense.

Military-to-amateur crossband operations will take place during 13-14 May 2000. All times below in Zulu (UTC) and frequencies in kHz..

Contacts will include operations in single sideband voice (SSB) and digital modes (RTTY, PACTOR, AMTOR, GTOR, and CLOVER). Some stations may not operate the entire period, depending on propagation and manning.

Participating military stations will transmit on selected Military MARS frequencies indicated below and listen for amateur radio stations in the ham bands indicated below. The military station operator will announce the specific amateur band frequency being monitored on-the-air. Hams should limit the duration of each contact to 3 minutes. Stations marked with an * will also broadcast the Secretary of Defense Armed Forces Day message.

AAZ-HQ Army MARS and Western Area Gateway, Fort Huachuca, AZ*

Operating Schedule: 13 May 1300-14 May 1300 UTC

Station mailing address: HQ USASC, Attn: AFSC-OPE-MA (MARS), Ft. Huachuca, AZ 85613-5000

4038.0-80m LSB, 6913.0-40m LSB, 7424.0-40m LSB, 13910.5-20m USB, 13993.0-20m USB, 21824.0-15m USB, 27788.5-10m USB
AAC2KYA-Glasgow, KY

Operating Schedule: 13 May 1300-2300 UTC

Station Mailing Address: HQs 1st BN 623d FA (MLRS), BN Signal Support NCO, 410 Cavalry Drive, Glasgow, KY 42141-1045

5760.0-80m USB, 7314.0-40m LSB, 10163.5-30m USB, 14402.0-20m USB, 18211.0-17m USB

AIR-Washington, DC

Operating Schedule: 13 May 1200-2400 UTC

Address: USAF MARS Station, 789TH Comm SQ/SCS-3, Andrews AFB, Washington, DC 20672
4026.5-80m LSB, 6894.5-40m USB, 7316.5-40m LSB, 13985.0-20m USB, 13996.0-20m USB

AIR-2-Edward AFB, CA

Operating Schedule: 13 May 1500-14 May 0300 UTC

Address: USAF MARS Station, P.O. Box 394, Edwards AFB, CA 93523

4488.5-80m USB, 6994.5-40m USB, 13983.5-20m USB, 14387.5-20m USB, 27983.5-10m USB

NAV-HQ NAVMARCORMARS Radio Station, Washington, DC*

Operating Schedule: 13 May 1200-14 May 0400 UTC

Address: HQ NAVMARCORMARS Radio Station, Nebraska Avenue Complex, 4234 Seminary Dr NW--Suite 19239, Washington, DC 20394-5461
4010.0-80m RTTY/LSB, 7348.0-40m RTTY/LSB, 14478.5-20m RTTY/USB, 20994.0-15m RTTY/USB

NAV-2-NAVMARCORMARS Radio Station, Charleston, SC*

Operating Schedule: 13 May 1200-14 May 0400 UTC

Address: NAVMARCORMARS Radio Station, 1050 Remount Rd--Bldg 3231, Charleston, SC 29406-3542

4016.5-80m RTTY/LSB, 7366.5-40m RTTY/LSB, 14470.0-20m RTTY/USB, 20678.5-15m RTTY/USB

NAV-3-NAVMARCORMARS Radio Station, Corpus Christi, TX*

Operating Schedule: 13 May 1200-14 May 0400 UTC

Address: NAVMARCORMARS Radio Station, 9035 Ocean Drive Suite 3A, Corpus Christi, TX 78419-5234

4014.0-80m RTTY/LSB, 7394.5-40m RTTY/LSB, 13974.0-20m RTTY/USB, 20997.0-15m RTTY/USB

NAV-4-NAVMARCORMARS Radio Station, Great Lakes, IL*

Operating Schedule: 13 May 1200-14 May 0400 UTC

Address: NAVMARCORMARS Radio Station, 615 Preble Ave, Camp Barry Bldg 153, Great Lakes, IL 60088-2850

4011.5-80m RTTY/LSB, 7376.5-40m RTTY/LSB, 14467.0-20m RTTY/USB, 21758.5-15m RTTY/USB

NBL-NAVMARCORMARS Radio Station, Groton, CT*

Operating Schedule: 13 May 1200-14 May 0400 UTC

Address: NAVMARCORMARS Radio Station, PO Box 161 Naval Submarine Base, Groton, CT 06349-5161

4041.5-80m RTTY/LSB, 7371.5-40m RTTY/LSB, 14391.5-20m RTTY/USB, 20623.5-15m RTTY/USB

NMH-USCG Telecommunication and Information Systems Command, Alexandria, VA*

Operating Schedule: 13 May 1200-14 May 0400 UTC

Address: USCG Telecommunication and Information Systems Command, 7323 Telegraph Rd, Alexandria, VA 22315-3940

4006.5-80m RTTY/LSB, 7386.5-40m RTTY/LSB, 14383.5-20m RTTY/USB, 20373.5-15m RTTY/USB

NPL-NAVMARCORMARS Radio Station, San Diego, CA*

Operating Schedule: 13 May 1200-14 May 0400

Address: NAVMARCORMARS Radio Station, 937 North Harbor Dr, San Diego, CA 92132-5100
4003.0-80m RTTY/LSB, 7351.5-40m RTTY/LSB, 14463.5-20m RTTY/USB, 20936.0-15m RTTY/USB

NUW-NAVMARCORMARS Radio Station, NAS Whidbey Island, WA*

Operating Schedule: 13 May 1200-14 May 0400 UTC

Address: NAVMARCORMARS Radio Station, 260 W Pioneer FSC Bldg, NAS Whidbey Island, WA 98277

4044.0-80m RTTY/LSB, 7381.5-40m RTTY/LSB, 13528.5-20m RTTY/USB, 20952.5-15m RTTY/USB

WAR-ARMY MARS Western Area Gateway Station, Ft Detrick, MD*

Operating Schedule: 13 May 1200-14 May 1200 UTC

Address: Commander, 1110th Signal Battalion, 1671 Nelson St, Attn: MARS Station Bldg 1678, Ft Detrick, MD 21702

4020.0-80m LSB, 6910.0-40m USB, 7363.0-40m LSB, 13512.5-20m USB, 14928.5-20m USB, 20518.5-15m USB

WDE-Wilmington, DE

Operating Schedule: 13 May 1300-2300 UTC

Address: DEARNG, STARC HQ, 1st Regiment Rd, Wilmington, DE 19808-2191

4438.5-80m USB, 6989.5-40m USB, 10150.0-30m USB, 14438.5-20m USB, 14512.5-20m USB

WUG-231-Memphis, TN

Operating Schedule: 13 May 1300-14 May 0600 UTC

Address: USACE Memphis District Office, Attn: Jim Pogue, Public Affairs Office Room B-202, 167 N Main St Memphis, TN 38103-1894

4032.0-80m LSB, 6826.0-40m LSB, 14484.0-20m USB, 14663.5-20m USB, 20973.5-15m USB

Secretary of Defense Message Test Via Digital Modes

The Secretary of Defense message will be transmitted from the stations below, including frequencies,

mode, and date/time in UTC. All frequencies are listed for center of intelligence. Offset as appropriate for your TNC. (Note: Not all stations may necessarily operate on all the frequencies listed, depending on propagation and available equipment.)

AAZ	6988.0/21825.5	RTTY 14 May/0230, PACTOR FEC 14 May/0310, CLOVER 14 May/0340
NAV	7346.5/14480	RTTY 13 May/2340, PACTOR FEC 14 May/0010, AMTOR FEC 14 May/0040
NAV-2	7365.0/14471.5	RTTY 13 May/2340, PACTOR FEC 14 May/0010, AMTOR FEC 14 May/0040
NAV-3	7393.0/13975.5	RTTY 14 May/0240, PACTOR FEC 14 May/0310, AMTOR FEC 14 May/0340
NAV-4	7375.0/14468.5	RTTY 14 May/0240, PACTOR FEC 14 May/0310, AMTOR FEC 14 May/0340
NBL	7370.0/14393.0	RTTY 13 May/2340, PACTOR FEC 14 May/0010, AMTOR FEC 14 May/0040
NMH	7385.0/14385.0	RTTY 13 May/2340, PACTOR FEC 14 May/0010, AMTOR FEC 14 May/0040
NPL	7350.0/14465.0	RTTY 14 May/0240, PACTOR FEC 14 May/0310, AMTOR FEC 14 May/0340
NUW	7380.0/13530.0	RTTY 14 May/0240, PACTOR FEC 14 May/0310, AMTOR FEC 14 May/0340
WAR	13514.0/14440.0	AMTOR FEC 13 MAY/2340, GTOR 14 MAY/0010, CLOVER 14 MAY/0040

◆ Submission Of Test Entries

Transcripts of the RTTY, PACTOR, AMTOR, GTOR or CLOVER receiving test should be submitted as received. No attempt should be made to correct possible transmission errors. Provide time, frequency and call sign of the military station copied, including name, call sign, and address (including ZIP code) of individual submitting the entry. Ensure this information is placed on the paper containing the test message. Each year a large number of acceptable entries are received with insufficient information, or necessary information was attached to the transcriptions and was separated, thereby precluding issuance of a certificate. Entries must be sent to the following military address:

Stations copying AAZ or WAR send entries to: Armed Forces Day Celebration, Chief, Army MARS, HQ, USASC, Attn: AFSC-OPE-MA (MARS), Fort Huachuca, AZ 85613-5000

Stations copying NAV, NAV-2, NAV-3, NAV-4, NBL, NMH, NPL or NUW send entries to: Armed Forces Day Celebration, Chief, Navy-Marine Corps MARS, Nebraska Avenue Complex, 4234 Seminary Dr NW--Suite 19239, Washington, DC 20394-5461

So there you have it: a chance to work and QSL quite a few military radio stations nationwide. I hope to see you all in May on the ham bands as we celebrate Armed Forces Day 2000. Good hunting.

Longwave Resources

✓ **Sounds of Longwave** 60-minute Audio Cassette featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more! \$11.95 postpaid

✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz. \$11.95 postpaid

Kevin Carey
P.O. Box 56, W. Bloomfield, NY 14585

Reference Aids

The most common question I get from readers is "where do I find a list of radio stations?" Back in February I reported on the release of the 20th edition National Radio Club *Radio Log*, a popular printed reference for DXers. I'm also frequently asked about computerized references, and this month an excellent reference has resurfaced with an updated version.

Neil Adams' *MW Database Viewer*, Version 1.5a, is now available. This is a program for browsing the Federal Communication Commission's Engineering Database, and displaying a wealth of technical information about stations throughout North America. Since it works with data files available for free download from the FCC's website, you can update the information yourself at any time.

The program displays a list of all stations on a given frequency. Click on the station you want more information on – it displays the power, transmitter coordinates, distance and bearing to your location, and predicted signal strength. If the station uses a directional antenna, a plot of the antenna pattern is also displayed. Additional tabs let you view the official and real sunrise and sunset times for the station's location. (If official sunrise is before real sunrise, the station is likely to be easily DXable during that period, as it will be operating with its greater daytime power while it's still dark.)

You can also display a layout of the station's towers. If you have Select Street™ installed, you can display transmitter locations on a street map. There are even provisions for playing stations' identification announcements, if you have a sound card. (You do have to make the recordings yourself, ID recordings are not provided with the program.) Information can be printed or saved to the clipboard for copying into other programs.

On a given frequency, you can sort stations by location, power, distance, last update, or most valuable, predicted field strength. I can tell, for example, that the four loudest stations at night on 1260 should be WNDE, WSDZ, KTTS, and WDKN. That prediction compares very well with what I actually hear. (It can also give you an idea of how excited you should be over your latest DX catch!) The list of stations shown can be filtered to show only nighttime operations, or only stations in the USA and Canada, or only applications for new stations, etc., and you can

search for a callsign or for all stations in or near a given city.

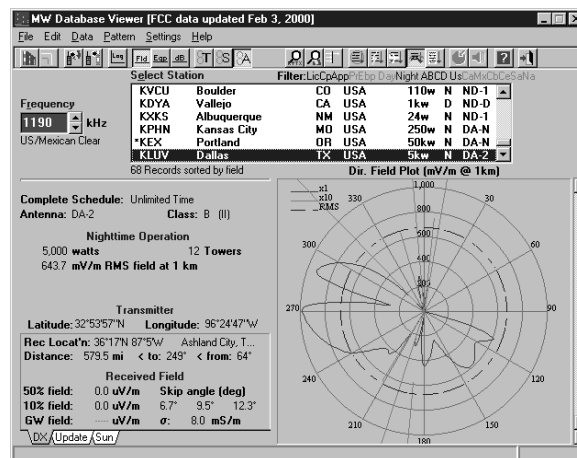
The primary shortcoming of this program is also its strength: it's based on the FCC Engineering Database, which is updated frequently, but doesn't keep track of non-technical data like program format, telephone number, or address. This program won't be of much help in getting a verification after you land that rare DX. You'll still need a copy of the *AM Radio Log* for that. But it's a valuable addition to your computer's desktop. *MW Database Viewer* is a shareware program for Windows 95/98/NT. A demo ver-

sion of the program is available for download from the dial, all the way from 790 to 1010, making it difficult to DX that part of the band. During a daytime bandscan, 22 different stations could be heard. A check of the database suggests these stations came from all over the eastern Caribbean, and from northern South America.

Phil Galasso of New Jersey noted a boo-boo on the FCC's website in late January. When someone requests a new callsign, the request is normally checked to ensure it's not offensive or misleading. At least at one time, you couldn't get the initials of the President or a living former President, or the initials of a federal agency. That

part seems to have been repealed (as there was a WFBI-TV in Memphis for a few years recently), but offensive combinations are still off-limits. One managed to sneak through; a four letter combination comprising an ethnic slur was assigned to the former K28FL in McAllen, Texas. The error seems to have been promptly caught, as the callsign was changed again in mid-February. Luckily for the Commission, there aren't many slurs or obscenities that can be spelled with four letters beginning with K or W...

I've received several interesting letters about my item on groundwave propagation in January *MT*. There will be more on this subject in an upcoming *American Bandscan*. If you've observed anything interesting while DXing during the day, please write: Box 98, Brasstown NC 28902-0098, or by email to w9wi@bellsouth.net. Good DX!



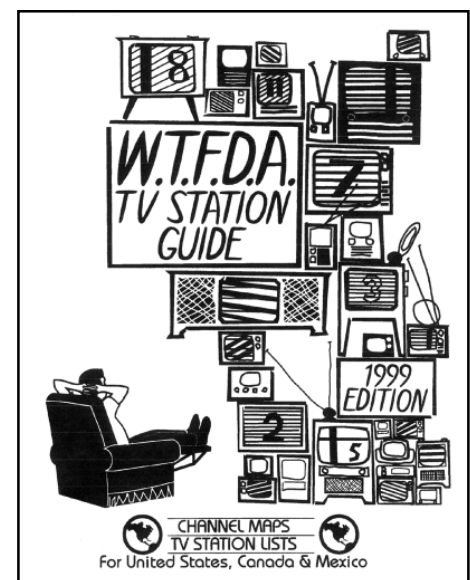
Here's what the *MW Database Viewer* screen looks like when the nighttime facilities of KLUV-1190 Dallas are selected:

sion can be downloaded at <http://www.home.earthlink.net/~nsadams>.

A new printed reference is now available for the TV DXer. The WTFDA *TV Station Guide* is now available. This publication provides technical and programming information on U.S., Canadian, and Mexican TV stations, including low-power stations and translators. Also included are maps for each channel, showing the locations of each station on that channel. You can get a copy for \$19.95 from Box 501, Somersville, CT 06072.

Bits and Pieces

John Ebeling in Minnesota recently did a bit of DXing from the southern coast of Barbados in the Caribbean. The expanded band, except for 1610 in the Turks and Caicos, is dead there. The 790 kHz station on the island is gone, moved to 92.9 FM, but the station on 900 kHz is still there. John says it splatters across 220 kHz of



WHYP Most Active North American Pirate Station

According to Greg Majewski's annual tabulation of North American shortwave pirate broadcasts, 98 broadcasts by **WHYP** made it the most active pirate broadcaster of 1999. The James Brown Memorial Station managed to average one broadcast every four days throughout the year. It nosed out **Radio Metallica Worldwide**, where Dr. Tornado's 69 transmissions bagged second place on the 1999 activity list.

Other frequently heard stations included **Free Radio America** (57), **KIPM** (37), **Blind Faith Radio** (31), and **Radio Tornado Worldwide** (31). Three stations tied for seventh with 26 broadcasts: **Radio Bingo**, **WMFQ**, and **WMPR**. Rounding out the top ten list of most active pirates is **KMUD** with 24 shows. All of these stations have been heard again during 2000 by *Monitoring Times* readers.

◆ What's on the Air

Our readers heard plenty of North American shortwave pirates this month; let us know what you have logged! As usual, we list programming formats and contact maildrops: A large majority of stations operate within 10 kHz of 6955 kHz, although it pays to tune around the band. Another place to check for daytime pirate activity is the region around 13910 kHz. The 15000-15100 kHz region between **WWV** and the 19 meter broadcasting band is starting to show some pirate activity again.

Blind Faith Radio- Classic rock is Dr. Napalm's consistent format. (Merlin)

Deliverance Radio- The dueling banjos are back. (None)

KMUD- This west coast outlet sometimes uses Morse code CW for IDs. They also sometimes move down to 6884 kHz; it pays to tune around. (Lone Pine)

KRMI- Not associated with licensed **WRMI**, they use a Radio Michigan International slogan. (None)

Midi Radio- Instrumental versions of rock standards predominate on this one. (uses midiradio@yahoo.com e-mail)

Radio Azteca- Bram Stoker's funny original comedy pokes fun at DXers and DXing. (Belfast)

Radio Bingo- If this station ever pays off, John T. Arthur is going to be a rich man. (using radiobingo@chek.com e-mail)

Radio Tornado Worldwide- Dr. Tornado's Radio Metallica has been less active in 2000 than in 1999, but his memory lives on via this parody station. (None)

Reefer Madness Radio- Their marijuana advocacy is named for the classic film. (Belfast)

Voice of Bozo- The station promotes a legend of

the Winter SWL Festival in Kulpsville, perhaps in association with the **Voice of Green Acres** in Oklahoma. (None)

Voice of Captain Ron Shortwave- Captain Ron's comments on the entertainment world flesh out his rock music format. (Uses captainronswr@yahoo.com e-mail)

Voice of Pancho Villa- Here's the original Kulpsville Winterfest legend, back for another raid through the airwaves. (Blue Ridge Summit)

Voice of the Runaway Maharishi- His Holiness the Maharishi promotes pirate radio and marijuana. (Belfast)

WHYP- North America's activity champion is still rocking away. (Uses whyp1530@yahoo.com e-mail)

REEFER MADNESS RADIO



host
Harry Anslinger jr

WKND- Peter Lautzenheiser heard Radio Animal being relayed on **World Harvest Radio's** 6045 kHz channel at 1545 UTC. Has anybody else heard this? (Pittsburgh)

WGMR- This new one gives IDs like **WMPR**, but plays rock, not dance music. (None)

WMFQ- Hard rock music is their staple, but they always promote QSL's. (Providence)

WMOE- Here's another rock music station, but their signature is a Three Stooges theme interval signal. (Uses wmoec6955@yahoo.com e-mail)

◆ Euros on 19 Meters

Two well-heard European pirate stations, **Alpha Lima International** and **Radio Free London**, have dramatically expanded their North American audience by using 19 meter frequencies this winter and spring. Alpha Lima has appeared on the abandoned BBC frequency of 15070 kHz, while RFL normally uses 15060.3 kHz. Many of our readers found surprisingly good reception from both outlets, sometimes around 2100 UTC and at other times around 0200 UTC.

The low end of the 19 meter band is now an important place to check during your search for pirate broadcasts. The programming is certainly not consistently scheduled, but at least one of

these stations has been breaking through to North America on most weekends. Alpha Lima International maintains a good web site, including links to other European stations at the <http://www.rendo.dekopi.nl/alinter> URL. You might consider checking the web site for breaking news.

It still pays to scan the ranges around 5805 and 6290 kHz for Europirates, although 49 meter signal levels are weaker than the Alpha Lima and RFL broadcasts on 19 meters. In addition, South American pirates **Radio Blandengue** and **Radio Cochiguaz** are still intermittently active on both 6950 and 14545 kHz, usually in lower sideband mode. Both can be reached via the Chile address listed below.

◆ Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 293, Merlin, Ontario N0P 1W0; PO Box 25302, Pittsburgh, PA 15242; and PO Box 928, Lone Pine, CA 93545, and Casilla 159, Santiago 14, Chile. Some stations verify logs in *The ACE* bulletin (\$21 via PO Box 15830, Chesapeake, VA 23328) or in *Free Radio Weekly* (free to contributors via yukon@mdn.net). Others solicit reception reports via e-mail addresses noted here.

◆ Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail addresses atop the column. This month begins my ninth year editing the Outer Limits. My thanks to hundreds of *MT* readers for your support!

This month we heard from John T. Arthur, Belfast, NY; Ranier Brandt, Hoefer, Germany; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Joe Filipkowski, Providence, RI; Al Fin, Hoogeveen, Netherlands; Bill Finn, Philadelphia, PA; Harold Frogge, Midland, MI; Raul Gonzalez, Santiago, Chile; Sheldon Harvey, Montreal, Quebec; William T. Hassig, Mt. Prospect, IL; Sean Ingram, Amelia, VA; Alan Johnson, Reno, NV; Dave Kirby, Willowick, OH; Peter Lautzenheiser, Wooster, OH; Gigi Lytle, Lubbock, TX; Greg Majewski, Oakdale, CT; A. J. Michaels, Pittsburgh, PA; Al Quaglieri, Albany, NY; Mke Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; DJ Stevie, Basel, Switzerland; Robert E. Thomas, Bridgeport, CT; and Niel Wolfish, Toronto, Ontario.

The Great Outdoors

By far, the most common complaint I hear from longwave listeners is noise – both natural (QRN) and man-made (QRM). Although there isn't much we can do about natural static – other than choose our listening times carefully – man-made static is another story. In the past we've covered ways of locating and curing static problems, but this month we'll take an entirely different approach – moving away from the noise.

In case you haven't guessed, I'm talking about DXpeditions. Hams are famous for these events. They pack up their gear and head for exotic lands for the sole purpose of putting a station on the air. Often, they are the only station operating from the chosen location – much to the joy of award-chasing hams "back home."

Listeners can also have DXpeditions. Perhaps their trips won't take them to truly exotic lands (although they might), but just getting away from urban centers can be equally rewarding when it comes to adding new catches to your log.

◆ Location, Location

Finding the right spot for your DXpedition is the main ingredient to success. A great deal will depend on whether you're going with a large group, or plan to have only a few attendees. In its simplest form, an event can be held at a campsite by simply pitching tents and setting up a small table to hold radio equipment. (See Figure 1.) This arrangement is well suited to warmer climates.

For larger gatherings, indoor accommodations are the preferred choice. For several years, I've joined a group of DXers that rent a large cabin in the lower Adirondacks during the month of November. Since this is the off-season for camping, the cost is quite reasonable. The site includes smaller cabins around the main building that serve as sleeping quarters. Such an arrangement allows around-the-clock DXing during all kinds of weather.

Another primary consideration for longwave events is noise level. Try to pick a location at that is at least five miles away from high voltage electric lines, and does not have fluorescent or sodium-vapor lights nearby. (It may be possible to have such lights turned off during your event.)

Before committing to a given location, I recommend surveying the site with a portable LW receiver to check for noise. While this does not guarantee quiet conditions at the time of your event, it will give you some idea of what to expect and may help avoid an unpleasant surprise when you're trying to pull in a weak signal.

Pre-visits also allow you to evaluate the possibilities for installing temporary antennas. For conventional wire antennas, you'll want to have some sturdy trees within 100 feet or so to secure your line. Users of active antennas or loops may only require a small post driven into the ground.

By the way, when using wire antennas, don't feel that you must string out a quarter-mile of wire for acceptable performance. I've found that under the

quieter conditions of a DXpedition, just 75 feet of wire is usually sufficient. (In fact, many portables suffer overloading when a long antenna is used.)

◆ Gear Checklist

Below is a brief checklist of things you may want to take on your DXpedition (besides your receiver, of course). The list is intended as a starting point, and can be customized to fit your individual needs.

- o Antenna wire, insulators, rope
- o Headphones
- o Reference books (beacon guide, maps, *MT*, etc.)
- o 2-meter handheld (or a cell phone)
- o Sleeping bag, pillow
- o Flashlight
- o Battery-powered alarm clock
- o Toiletries
- o Logsheets, pencils
- o Food, snacks
- o A good non-radio book
- o Camera
- o Tape recorder
- o Small parts & equipment (fuses, connectors, electrical tape, multimeter, hand tools, etc.)

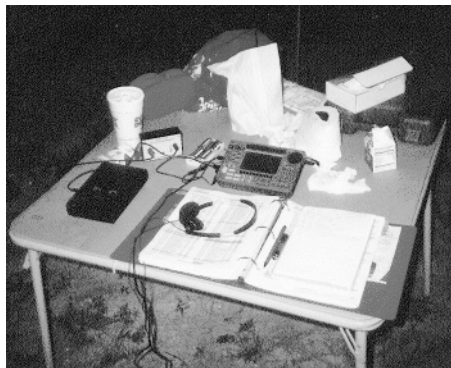


Figure 1. The Essentials for a DXpedition – Receiver, headphones, beacon guide, snacks and a carton of milk! Photo by Dick Pearce (VT) taken while on DXpedition in Florida.

◆ Communications

As noted in the list, it is desirable to have some form of two-way communication while on a DXpedition. Wired phones may not be readily available, so I suggest taking along your 2-meter handheld (if you're a ham), or a cellular phone.

Two-way communication was invaluable at an event I attended a few years ago. We needed to report a fire, and using a 2-meter radio, we contacted a distant ham who alerted the local authorities. As the local siren began to wind up, I knew that ham radio had done its job. (Try doing that with the Internet.)

◆ The Big Day

If you're going to a DXpedition, I recommend getting there early. For weekend events, I try to arrive on Friday afternoon while there is still some daylight left. This allows time for setting up stations, stringing antennas and getting the bugs worked out of the installation.

As other DXers arrive, welcome them to the site and offer to assist them with setting up their equipment and antennas. Before long, a brief meeting should be held to introduce the participants, discuss emergency procedures, food arrangements, facilities, etc.

Beyond that, there's not much more to be said. The rest of the time is yours to tune the bands. I think you'll find, as I have, that it's hard to beat the quieter conditions and camaraderie offered by a DXpedition. Have fun, and be sure to send some pictures to Below 500 kHz!

I'd like to hear from listeners interested in hosting or participating in a DXpedition in the Northeast US. If there is enough interest, perhaps an event could be organized specifically for longwave enthusiasts. Drop me a line at *MT* if you have thoughts or suggestions.

◆ BeaconFinder Update

If you've ordered a *BeaconFinder Guide* since October 1998, you may want to note the following additions in your book. My thanks to Dick Pearce (VT) for supplying this information. The complete *BeaconFinder* is still available for \$11.95 (postpaid) from: Kevin Carey, P.O. Box 56, West Bloomfield, NY 14585.

Additions to BeaconFinder

233	EYK	Chesapeake, VA
234	RYD	Green Cove Springs, FL
261	2H	Label Sur Quevillon, QC
327	PDG	Watsonville, CA
328	LC	Laconia, NH
330	PWC	Pine River, MN
357	IM	Asheville, NC
363	T6	Pemberton, BC
373	AV	Mecklenburg, VA
400	VQ	Alamosa, CO
412	JHH	Griffin, GA
414	LYI	Libby, MT
413	2C	Atkinson Point, NT
428	POH	Pocahontas, IA (Ex-314 kHz)

◆ TST Found

Last month we reported a new beacon – TST/220 kHz – widely heard in central New York State. Thanks to the efforts of Frank Reynolds (KC2FDW), the station has been found. Using direction finding gear, Frank was able to pin the beacon down to Barnard Road in the Town of Schroepel, NY. This site is roughly 10 miles from the Syracuse Airport and likely supports their NW/SE runway. The latitude and longitude coordinates for TST are 43° 17'N by 76° 18'W.

The NOGAnaut

At a recent meeting of the EPA (Eastern Pennsylvania) QRP club one of the members (AD3O) showed up with transmitter kits for the entire membership. The kit is the NOGAnaut designed by KO4WX (see fig one; fig two is the parts list). Originally the Micronaut by Dave Ingram, the transmitter has been redesigned by the North Georgia QRP club for increased power and centered on the club's 3686 frequency. I doubt if there is a simpler circuit that will get you on the air and working stations. This little rig is designed to work over a voltage range of 9 to 15 volts and will put out 20 to 50 milliwatts.

The NOGAnaut is not an end all to transmitters, but intended to be a starting point. Build one and expand on it. It is a nice circuit to experiment with. One modification I have made is to use a pair of variable caps for C1 and C2 so output can be optimized at any frequency. I have also installed three crystal sockets (HC-25) and a switch to change frequency. The possibilities go on!

I built my kit in about two hours and put it on the air the same evening. Using a 9 volt battery salvaged from my son's portable radio, I worked three stations; best DX was about 150 miles. Power was about 20 milliwatts.

The NOGAnaut: Parts List

Part	QTY	Value	Tech America Part Number	Label
C1,C2	2	430 pF or 330+100 or 220+220	430 pF not carried 900-2208+900-2201 900-2205+900-2205	431 331 + 101 221 + 221
C3	1	0.01 uF	900-2253	103 or .01
C4	1	750 pF or 680+68 or 470+330 or 560+180	750pF not carried 900-2214+900-2199 900-2213 + 900-2211 560pF not carried	751 or 750 681+68 471+331 561+181
C5	1	100 pF	900-2201	101
J1	1	RCA jack	910-0869, -0870, -4091	
L1	1	100 uH	900-4967	brown-black-brown
L2	1	4.7 uH or 4.3 uH	900-4958 33 t #26 on T37-2 core (900-7008)	yellow-violet-gold red core
Q1	1	2N2222A	900-5428	2N2222A
R1	1	10K 1/4 watt	900-0242	brown-black-orange
R2	1	270 1/4 watt	900-0204	red-violet-brown
R3	1	4.7K 1/4 watt	900-0234	yellow-violet-red
X1	1	3686.4 KHz	900-5096	3.6864
J2	1	9V holder	900-0344 or equivalent	

Amateur Radio 101

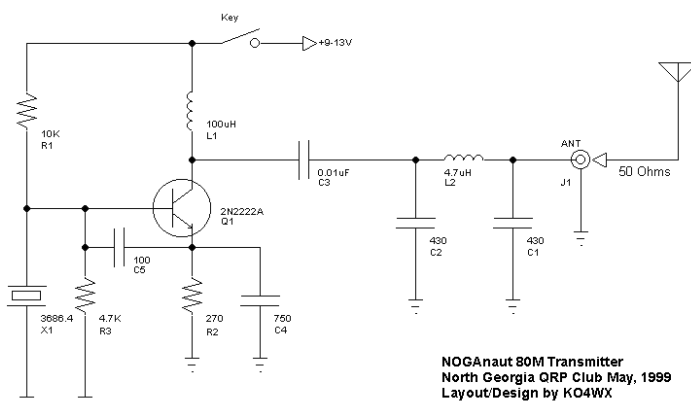
I have been writing for *Monitoring Times* for a long time, and get a lot of mail. Much of it is from newcomers with questions ranging from what kind of rig should I buy, how do I make contacts, best antenna, modifying rigs and more. I do try to answer all questions but it is difficult sometimes, as my opinion is mine and not always what is best for you and I simply do not have all the answers.

In an effort to give better assistance to everyone with questions about radio (SWL, ham, scanner, etc) I have established a radio community called AMATEUR RADIO 101 on the web at www.onelist.com; the address is amateurradio101@onelist.com. Everyone is welcome; there is a chat room, and message board as well as a member list. At present there are only a handful of members. We are looking for old timers, Elmers and more experienced radio hobbyists to help newcomers along as well as the beginner. Check in and join the community.

E_s

June is the traditional beginning of the Sporadic E season. Sporadic E propagation enhances signals on VHF so that contacts out to 1500 miles or more are possible. Prediction of when a session of Sporadic E will take place is difficult so the best thing to do is to keep a receiver tuned to the major VHF calling frequencies; when you start to hear lots of ac-

NOGAnaut 80M Transmitter



NOGAnaut 80M Transmitter
North Georgia QRP Club May, 1999
Layout/Design by KO4WX

tivity, chances are an E_s opening is in progress.

This past winter has had a lot of excellent VHF openings, so the potential is good for a lot of heavy E_s openings this spring and summer. Propagation in general has been extremely good this past winter. On ten meters there have been days when the entire world could be worked with low power. One particular opening I caught was solid all over Asia, and contacts into the far east were as easy as working the next town on a repeater.

That's all for May folks; keep the letters and e-mail coming and do check out Amateur Radio 101.

You can check out the North Georgia QRP clubs project page on the web at www.qsl.net/nogaqrp/projects/NOGAnaut/NOGAnaut.html. I am sure they would like to hear about your experience duplicating this little rig.

Antenna Designer

New Version 2.1 for Microsoft Windows 95 and 98
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Some Thoughts on Multi-Band Antennas

First some definitions: For reception purposes an antenna that is resonant is, in a way, similar to a bell. When sound waves strike a bell, they cause the bell to vibrate. The amount of vibration the sound waves cause is relatively small unless the frequency of the sound is the same as that produced by the bell when struck (the bell's resonant frequency). When sound waves of the bell's resonant frequency encounter the bell, it rings, and, if the waves are not too weak, we can hear the ringing.

Similarly, a radio wave encountering a receiving antenna causes current to flow in the antenna, but the amount of current is relatively low unless the frequency of the radio wave is the same as the resonant frequency of the antenna. When the resonant frequency of the antenna and the frequency of the passing wave are the same, then the current caused to flow in the antenna is considerably greater than when the wave's frequency is not at the antenna's resonant frequency.

And, just as a bell made of lead resists ringing as compared to a bell made of steel, an antenna with much ohmic resistance will resist "ringing" when radio waves encounter it. We say that the quality factor, or "Q," of an antenna with high ohmic-resistance is low, and this makes for an inefficient antenna.

Getting an antenna to both behave in a resonant fashion, and to exhibit a reasonably high Q over multiple bands is often difficult.

What Is a Multi-band Antenna?

As suggested earlier a multi-band antenna is one which gives acceptable performance on more than one band of frequencies. Just what that "acceptable performance" is varies considerably between different applications. If you are satisfied with the reception you get on the

bands of interest to you by using only a 15-foot length of wire strung across your ceiling then that wire is a multi-band (MB) antenna for you.

Another MB antenna is the whip antenna often found on multi-band portable receivers. But neither the whip nor the wire mentioned above is a very effective MB antenna. They won't be resonant on all the bands where they are utilized – perhaps on none of them. They won't be stimulated to "ring" as strongly as if they were resonant. Thus they develop relatively low output when stimulated by passing waves.

It is tempting to also say that such a small antenna will not capture much signal, but the idea involved here, sometimes called "capture area" is not an intuitively-obvious concept. Very small, high-Q antennas can sometimes capture substantial amounts of signal at a specific frequency. Unfortunately, these small antennas have extremely narrow frequency coverage. And so, for MB use, we usually want an antenna at least a quarter-wavelength to a half-wavelength in size.

And Yet:

After all is said and done we should keep in mind the effect of received noise at HF and lower frequencies. The noise part of the signal-to-noise ratio (S/N) is often primarily received noise. This means that the signal will be about the same level

above the noise for all usable levels of a specific received signal. In other words, increasing received signal strength once the signal is detectable doesn't necessarily improve signal quality. So a better antenna doesn't necessarily give better reception in such cases, and a simple longwire may give results as good as a "better" antenna.

On frequencies above the HF band there is usually so little received noise that the S/N ratio is determined primarily by the noise generated within the receiver itself. Here the amount of signal received from the antenna is a more important consideration, and antenna performance becomes more important.

Even on HF you can reduce received noise, and improve received S/N by use of a directional antenna to reject noise from off-beam directions. And when received noise is unusually low naturally (as in rural areas or upper latitudes) a good HF antenna can help by increasing received-signal strength above the receiver's internally-generated noise (now the primary noise in the S/N).

Some Multi-band Antenna Designs

Can we simply build or buy a MB antenna, and have MB reception as good as if we had a single-band antenna for each band separately? Probably not, because unfortunately each MB design has its limitations, and these must be

weighed against the advantage of having one antenna to deal with rather than several. Four common ways of obtaining MB operation are shown in fig. 1.

Some other antenna designs such as the log-periodic and discone provide MB coverage without the trap-loss problems discussed below. An endfed longwire and tuner, or a dipole antenna with a tuner and open-wire feedlines (fig. 1C and 1D), have long been used by hams to provide good MB cover-

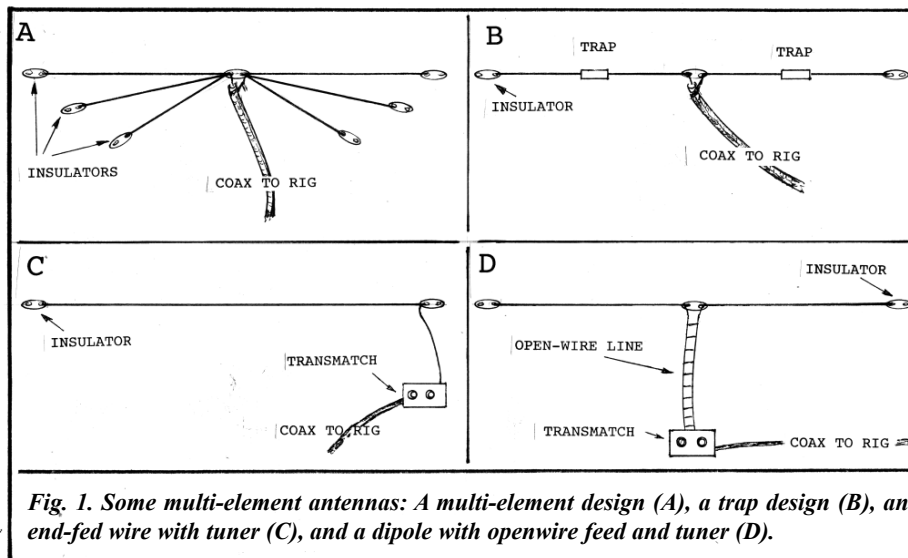


Fig. 1. Some multi-element antennas: A multi-element design (A), a trap design (B), an end-fed wire with tuner (C), and a dipole with openwire feed and tuner (D).

age with one antenna. Keep in mind that, above the resonant frequency of the antenna, with 1C and 1D the radiation-reception pattern fractionates into lobes.

The multi-element antenna of fig. 1A utilizes multiple dipoles each of which resonates on a different band. The proximity of the elements to each other causes an interaction, and simply computing the element length by standard formulas isn't enough. When the antenna is installed the elements may require significant adjustments in length if the antenna is to be resonant.

It should be pointed out that some change in resonant frequency due to installation factors is a common occurrence for most types of antennas. Not only nearby objects such as live trees, or buildings containing metal, but even such things as the antenna's height above earth, and the earth's moisture content can affect an antenna's resonant frequency (not to mention radiation-reception pattern).

Figure 1B shows a trap antenna. Poorly made or dirty traps can have low Q (excessive resistance), and therefore unacceptable losses. Clean, well made traps offer losses low enough to make their use worthwhile where single-band antennas are not a reasonable option.

◆ In Summary

Small, non-resonant, or low-Q antennas mounted at low heights may suffice where modest MB performance is acceptable. For better MB results a full-size MB design with multiple elements or good-quality traps, mounted high, and tuned to resonance after installation is a good choice. An end-fed long wire with tuner, or long dipole with open-wire lines and a tuner, mounted high, may be even better, especially in transmitting applications. For excellent results several full-size, single-band antennas, mounted high, are a better MB choice where space allows.

◆ This Month's Interesting Antenna-Related Web site

Copies of various antenna books are often available on www.ebay.com at relatively modest prices. Information on building your own MB antennas, and much more, will be found in *W1FB's Antenna Notebook*, Orr's *HF Antenna Handbook*, Carr's *Practical Antenna Handbook*, the *ARRL Antenna Book*, or the *RSGB HF Antennas for All Occasions*. All these books contain a wealth of antenna information. W1FB's and Orr's are probably best for beginners.

Radio Riddles

Last Month:

I asked: "In the past we have sometimes mentioned non-resonant antennas. Are these antennas all just mistuned, wannabe resonant-design antennas? Or are some antennas intentionally designed to be non-resonant?"

Well, due primarily to the fact that we don't build our antennas in outer space, we have lots of wannabe antennas that should be resonant but aren't. On the other hand some antennas are intentionally designed to be non-resonant. Examples of non-resonant antennas include the Beverage, the non-resonant V, and the non-resonant rhombic.

This Month:

Ohmic resistance is mentioned above. Isn't all resistance "ohmic?" What other kind of resistance could an antenna possibly have anyhow?

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. Till then Peace, DX, and 73.

GROVE

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The Radio Becomes a Home Appliance

By the late 1920s, most of the key innovations and advancements in radio circuitry had been made. The early 1930s saw the beginning of a fascinating *new* stage of development – one in which the radio receiver was transformed from an expensive device that looked like a piece of laboratory apparatus into a home appliance that could be turned out economically using the techniques of mass production. Components formerly made to be looked at and admired now shed their decorative casings, becoming smaller and more efficient. This made it possible for the physical layout of the radio receiver to become more integrated and compact.

◆ A Telling Comparison

Take a look at the layout of the 1920s three-dial battery Neutrodyne of Fig. 1. As you can see, the three-dialer was assembled in “building block” style, with each stage following the other in straight line fashion. The discrete components making up each stage are readily identifiable, and a reasonably knowledgeable person can deduce most of the details of the set’s schematic simply by inspection.

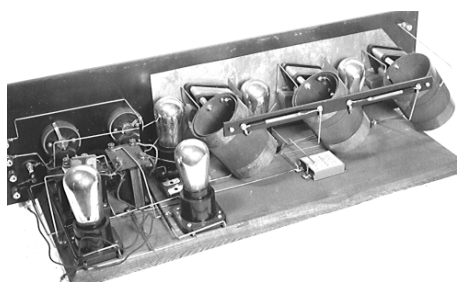


Fig. 1. Interior view of a Neutrodyne 3-dialer shows straight-line component arrangement.

If you should take the time to look back at the interior photo of the Atwater Kent Model 42 (Fig. 2 in our March 2000 column), you would see that the early a.c. sets were not much different. Most of the individual parts of the radio are clearly identifiable and the schematic can be deduced from a casual inspection. Note that the three individual tuning capacitors of the TRF stages are still visible (though they are

now belted together for single control operation). The a.c. power pack, seen below the radio deck, is a separate unit connected to the radio proper by a multi-conductor cable.

Compare the layout of those sets with that of the 1930s TRF radio chassis of Fig. 2. One of the first things you’ll notice is that the three tuning capacitors are no longer individual units. Instead they are all mounted on the same shaft as a single component. The tubes, coils and other parts associated with the TRF stages could now be grouped around the ganged tuning capacitor, minimizing lead length and making for a much more compact arrangement. Completing the semicircle around the tuning cap assembly are the detector, audio amplifier, and power supply rectifier tubes as well as (upper right) the power supply transformer.

Yes, the power supply unit is no longer a separate unit, but is now mounted on the same chassis as the rest of the radio. This change, however obvious, was responsible for dramatic reductions in manufacturing costs and cabinet size. Another dramatic change in radio cabinets came about as a result of improvements in loudspeakers.

◆ The Shrinking Loudspeaker

The speakers formerly used with the old battery sets were essentially headset drivers with big horns added to magnify the volume. The permanent magnets on which their operation depended could be made only so strong by the technology of the day. By the late 1920s, the horns had given way to large cone speakers. However, these still were energized by headset-type drivers.

Early in the 1930s, *dynamic* speakers containing powerful electromagnets operated from the radio’s power supply came into use. This more efficient design, coupled with the increased audio output available from the a.c.-operated sets, meant that speakers no longer had to be huge to provide room-filling sound. The big 10" or 12" cones shrank to 6" or 8" – small enough to fit inside the radio cabinet.

Fig. 3 compares the speaker from the Atwater Kent 42 with a dynamic speaker from a 1930’s radio. You can clearly see the significant downsizing made possible by the new tech-

nology. And you can also see how the loudspeaker evolved from a separate unit sold as an accessory to a component intended to be an integral and permanent part of the radio itself. The multi-wire cable connected to the dynamic unit contains a pair of leads to carry the audio signal and another pair to carry the d.c. voltage for activating the electromagnet.

◆ Cabinet Metamorphosis

The presence of the loudspeaker inside the radio cabinet, coupled with the more compact construction of the chassis, resulted in a very distinctive new look for the table model radios of the early 1930s. The “footprint” of the radio became smaller, and the set also grew taller to accommodate the speaker that was now inside. Wood replaced metal as the cabinet material of choice – possibly because it provided a more resonant housing for the internal speaker.

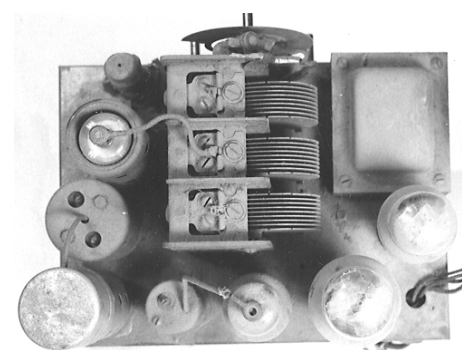


Fig. 2. Early 1930s set shows much more sophistication. Components are grouped around “unified” tuning cap; power supply is on the chassis.

Today, collectors call these cabinets “cathedrals” or “tombstones,” depending on whether the cabinet sides curve inward to form an arch over the loudspeaker or continue straight up, ending in a flat top. Of course, those new 1930s radios were not always table models. The big living room console was also becoming a popular concept, and in this cabinet style the speaker was usually mounted *below* the radio chassis, elevating the chassis and controls to a more convenient height.

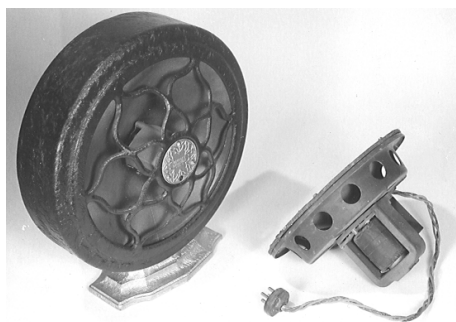


Fig. 3. The downsized early 1930s speakers (right) could be conveniently installed in table model radio cabinets.

◆ Opening the Mailbag

Here are some comments received by e-mail and snail mail from folks who tell me that they are enjoying the new column. The reader's city and state is given if known; full contact information is given if necessary.

Brian Bursack says that he has been SWLing for about 20 years, but didn't get turned on to classic radios until he recently stumbled upon Jasper's 10,000-item antique radio museum in St. Louis. He plans to send us some pics of this wonderful establishment. [Watch for a feature article by *Bob Tarte* on the Jasper museum in the June issue - ed.]

Jim Hartland (North Olmsted, OH) was disappointed when *Electronics Now* magazine disappeared, along with my antique radio column, after the December 1999 issue. But since Jim subscribes to this publication, his disappointment lasted only until the January 2000 *MT* arrived! *Larry Fowkes* had exactly the same experience. And though Larry owns just a couple of classic sets and doesn't seriously collect, he finds reading about the old radios to be a soothing influence in our fast-paced high-tech world.

Nick Terrence has been collecting plastic radios from the 1950s for about three years, but is frustrated because he hasn't been able to find a good source of repair advice and information. He hopes that this new column will help him, and I certainly intend for it to do just that. *Jim G.* (last name not given) finds the historical information we are now presenting quite useful. My friend *Bart Lee* (San Francisco, CA), a long-time SWL and an authority on the subject, writes that he enjoys listening on a classic radio. The mellow sound of its vacuum tube electronics and wood speaker enclosure adds a lot to his enjoyment of the hobby.

Peter Venlet (Zeeland MI), sent a pic of a magnificent speaker enclosure that he built for his Hammarlund HQ-129X receiver. Crafted

of fine woods, the enclosure incorporates the distinctive Hammarlund tuning-capacitor-symbol logo into the grille design. It's a superb replacement for the very rare HQ-129X accessory speaker! *George Appleton* doesn't divulge his age, but tells us he is old enough to remember some of the sets we've been discussing back when they were new. A Navy radioman during World War II, he shares some interesting memories of sets he's owned and seen.

Scott Rayer (San Francisco area) wonders if there is a market for a Pilot 602 stereo tuner/amplifier in a console cabinet. If interested, contact him at SRAYER@BKF.COM. Another query comes from *Ralph Coviello* (63 North Railroad Ave, Mahwah, NJ 07430; kc2bcy@aol.com). He is looking for information on an interesting "hybrid" radio just added to his collection. It is a Columbia Model C2 made by Brandes Products for Kolster Radio. The set is equipped with a Kolster power supply/amplifier unit. Ralph hopes that a future column will be devoted to antique radio information sources, and that is definitely in my plan.

Bob Hopkins (Orangevale, CA) enjoys working on old battery sets and just restored a Radiola 20 for a friend. *Alan Beilharz* (Coloma, CA) is a lifelong SWL and AM DXer. Though he's never been able to devote time to radio restoration, he enjoys reading about it in the column and finds the information on the old circuitry and history to be quite fascinating. Finally, I've received a couple of long chatty notes from a gentleman in Fayetteville, NC, who does not sign his name. He loves the old a.c.-d.c. sets and says that they are discounted in most antique radio discussions; he hopes I won't ignore them. No danger of that; I enjoy them too!

◆ Publications Corner

On my desk right now are some new publications from my friends at The Xtal Set Society (P.O. Box 3026, St. Louis, MO 63130). Among the interesting pieces in the March issue of the Society newsletter is an article on how to build a "gallows style" headphone receiver completely from scratch. It's a long excerpt from *The Voice of the Crystal* by H. Peter Friedrichs.

The book (6" x 9" soft cover; 185 pages; 120 illustrations) is a fascinating compendium on how to build such radio components as capacitors (fixed and variable), coils (including basketweave types and variometers), detectors, headphones and tuners. The projects use no special tools and no technology not consistent with the early days of radio. Vintage set builders will find the information in this volume a



Here's the handsome speaker that Peter Venlet home-crafted for his Hammarlund HQ-129X.

boon – allowing them to create for themselves authentic parts otherwise difficult or impossible to obtain. It's available from the Society for \$14.95 plus \$3.75 s&h.

In the same newsletter, Bill Simes, W0IXC, tells how he built a loop-antenna crystal set onto his computer-room door. You'll also find the final installment of Mike Peebles' "Gilligan's Radio," a one-tube regen set built, like the Friedrichs projects, entirely from scratch – right down to the tube socket.

To join the Society and receive the bi-monthly newsletter, send \$12.95 (one year) or \$23.95 (two years). Canadian and international subscriptions are \$14.00 per year US and \$19.00 per year US, respectively). To find out more about this interesting organization on line visit www.midnightscience.com.

Bye till next time. In the meantime – as always – I'd be pleased to hear from you! The e-mail address is in the column heading; my snail mail address is Marc Ellis, P.O. Box 1306, Evanston, IL 60204-1306. All communications will be acknowledged in future columns.

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Tune up that whistle with DSP

Twenty-two years ago I was a very avid shortwave listener and an active member of SPEEDX. Using a trusty FRG-7 with a home-made digital display, many hours a week were spent logging the world. It was very enjoyable, except for the heterodyne whistles! These loud whistles resulted from stations which had closely adjacent or overlapping frequencies. Stabbing the brain with these loud continuous tones for an hour, and SWLing becomes a fast route to a headache; not to mention divorce if I didn't use headphones.

Today, although the shortwave bands are not as crowded, heterodyne whistles and electrical noise can still take all the fun out of any monitoring. This month, we are going to look at two computer programs which may herald the end of whistles and noise: the bane of monitors everywhere!

Audio filtering comes in many forms: passive components, active elements, and most recently, digital filters. The first of these filter methods goes way back to the beginnings of radio. It uses time constants associated with the interaction of inductors, capacitors, resistors and electrical signals. Using specific fixed component values chosen to eliminate a specific interfering frequency, or range of frequencies, filter circuits could be built. Banks of filters were employed where frequency flexibility was required.

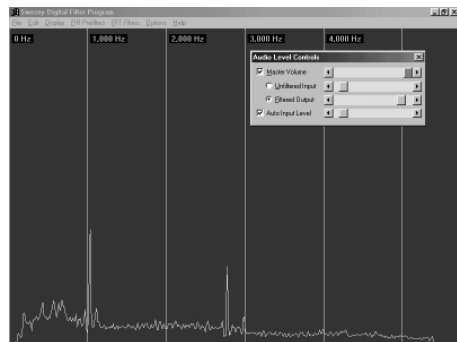


Figure 1 Swezey Digital Filter Main Screen – Notice Two Whistle Spikes

The second method became popular in the nineteen seventies as integrated circuits allowed easy and economical use of high quality operational amplifiers. These amps are the building blocks of active filters. They enhance the behavior of the passive components resulting in active filters. A later variation, which led the way to future filtering methods, used active circuits to “act” like passive components. The unique feature of these filters, such as switched capacitor filters, was that they were “tunable.” No longer were filters fixed to given frequencies or characteristics.

◆ Enter the Digital Revolution

As semiconductor engineering became more advanced, the simple integrated circuit evolved into the

microprocessor. As microprocessors' capabilities increased in speed and complexity, near real-time data processing became a reality. The digital signal processing (DSP) world of compact disc, laser disc and DVD was born. This technology was applied communications in the form of DSP chips. These devices use software routines, or algorithms, to manipulate and filter signals.

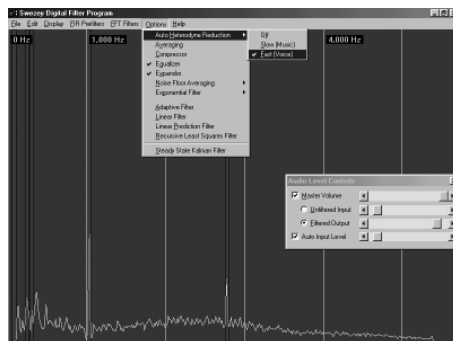


Figure 2 Swezey DSP in Automatic Heterodyne Rejection Mode

An audio DSP chip is connected between a receiver and a speaker. First it converts the audio into a digital data. Once in the digital domain DSP chips can simulate high quality audio filters of most any type via software routines. Pretty nifty. Then the “filtered” digital signal is reconverted back into audio – sans whistle or noise.

This time we'll look at two programs for your computer which give you DSP audio filtering functions for your scanning, medium or shortwave monitoring. If you have a 200 MHz Pentium computer with a sound card you already have all the hardware.

“Swezey-fying” Your Monitoring

The first DSP software audio package is the Swezey Digital Filter Program. We used the standard (non-stereo) licensed version 1.3.2.0. All you will need is MS-Windows 95/98/NT running on a 200 MHz (or faster) computer, a sound card and a receiver. As usual, when using a receiver and a computer, it is recommended to employ a shielded antenna in order to minimize computer-generated noise. No installation is required other than copying the program to the desired directory. Now all we have to do is to connect the external speaker/Line Out of our receiver to the Line In of our computer's sound card, and we are ready!

◆ Turning Things On

First – Be careful to minimize all volume/level controls: the receivers, the computers and the external power amplifier (if you use one as I do). If you don't you could blow out your speakers. Then turn on your computer and your receiver. Tune to a broad-

cast station for use during setup. Increase the input level of your Line In until you hear the broadcast station. Usually this is done via right clicking the speaker icon on the lower right of your screen.

Now let's run the Swezey DSP Program. The entire program is controlled from one screen, which displays the audio spectrum of the Line In signal. A screen similar to Figure One will be displayed. Here, we are tuned to a frequency in the medium wave band where two adjacent stations are making life noisily difficult. The culprits are visible in Figure One as two “spikes”; the large one at 1,000 Hz and a smaller one at about 2750 Hz. Oh yes, Deja vu! The painful whistles bring me back twenty years to the FRG-7!

◆ Be Gone, Satan!

The Swezey Digital Filter can attack this cacophony in a number of different ways. The easiest, totally automatic method is via the Options command menu, right above the frequency markers. See Figure One. Clicking Options brings us to the Auto Heterodyne Reduction (AHR) menu. Then choose Fast (Voice), since we are attempting to listen to talk programs. See Figure Two results. Notice that the two spikes, seen in Figure One, are covered by broad vertical bars. The Auto Heterodyne Rejection function has found the frequencies having constant amplitudes which correspond to our whistle. Then it has applied notch (band stop) filters to them, indicated by the broad vertical bars. The result is beautiful, whistle-less audio. No headache here!

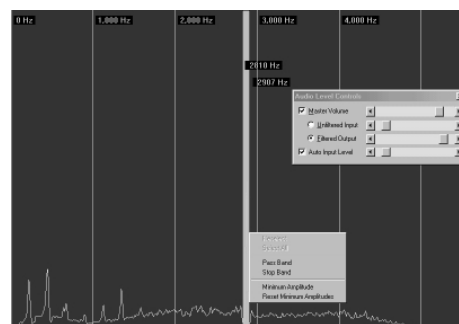


Figure 3 Swezey in Manual Mode Taking Care of a 2850 Hz Monster

If you look carefully, you will see other broad bars. The AHR has found smaller spikes and automatically notched them out as well.

Alternatively, we could have manually notched out the offending frequency ranges. We can generate notches by positioning the cursor to the left of a spike. Click and hold the left mouse button. Now move to the right of the spike and releasing the left mouse button. A broad vertical bar appears over the spike. Right clicking on this area, allows us to make it a Stop Band (notch). See the middle region of Figure Three. With the Swezey program you can manu-

ally setup a number of these notch Bands. Figure Three shows this manual method on a 2850 Hz "whistle." And yes, this signal then became listenable.

◆ Predefined Filters

Under the FFT Filters menu (Fast Fourier Transform – a mathematical methodology) there are thirteen predefined filters. Three are specifically for voice applications and two are for music. A notch, three high pass and four low pass filters, each at a fixed frequency, can also be employed with just a mouse click.

◆ How Does It Work?

It does a great job making an interference-ridden signal listenable. The Swezey program is very easy to use and worked without a major problem. Some small glitches were noted. The display sometimes seems to do strange things for a few seconds. It's not a real problem since the filter's operation is not affected.

The automatic level function, sometimes, doesn't quite get it right. The effect is very low audio output. However, I found that this is easily remedied by going to the manual level control setting, and then back to automatic.

Swezey also provides other filter types and features that we haven't covered. The flexibility and usefulness that the Swezey program provides far outweighs these operational quirks.

◆ One Real Issue

Earlier, I stated that DSPs perform "near real-time data processing." Well, the "near real-time," in the case of the Swezey program, adds a delay of over 1.5 seconds on a Pentium I, 233 MHz computer. This delay makes tuning while listening to the Swezey filter's output impossible. But all is not lost.

All it takes is the ability to monitor the receiver's audio before filtering. This can be accomplished by selecting the Unfiltered Input on the Audio Levels Control menu. See Figure Two. Once a signal is tuned in, choosing Filtered Output will allow you to use the filter.

GNASP1 - The Other DSP

GNASP1 is an experimental version of a DSP based audio signal processor. The program requires a 200 MHz PC running Microsoft Windows 95, Windows 98 or Windows NT. As stated in the instruc-

tions, "It is absolutely essential that a full duplex driver is used" with your sound card. These days, duplex sound card capability is the norm. GNASP1's command structure is far less elegant than Swezey's, relying on a single list of fixed filters. See Figure 4. Sixteen filters are predefined: eight low pass, six pass band and two high pass.

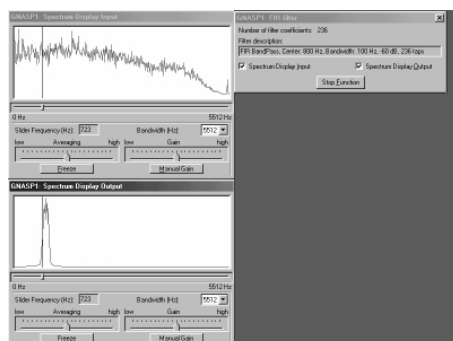


Figure 5 GNASP1 – Pass Band Operation

◆ Seeing What You Hear

Once the filter is chosen the program displays two screens. See Figure 5. The top screen shows the audio spectrum prior to filtering. The bottom screen indicates the audio spectrum after going through the filter. In this case, we have applied a band pass filter, centered at 800 Hz and having a 100 Hz width. All other frequencies will be highly attenuated, as the bottom screen indicates with a peak around 800Hz.

◆ Well – How Did It Do?

GNASP1's installation was also very easy. Each of its sixteen filters worked well. The additional screen showing the resulting spectrum is a nice touch.

GNASP1 also has a user configurable filter capability, and comes with 2200 Hz low pass filter. The instructions indicate that with the "appropriate program" the user can program custom filters. But it does not give information on where the "appropriate" program can be obtained.

As with Swezey, GNASP1 delayed a real-time input by about 1.5 seconds. This again can be overcome by first selecting "Direct mapping of input to output" on the filter list. Once a station is tuned in, then you can choose a filter from the menu.

Although GNASP1 worked well, it is clearly a work in progress, as it states in its instructions. But since there is no charge for GNASP1 you can use it to see if DSP filtering is for you. If it is, it may be enough. If not, then the \$50 for Swezey Digital Filter will be worth it.

◆ Now You Try Them

Download GNASP1 at <http://members.tripod.com/~gniephaus/gnasp1/gnasp1.html>.

The Swezey website at <http://www.winternet.com/~swezey/dsp.htm> will allow you to download a "crippled" version which has sporadic noise bursts. You can also get ordering details for the full, uncrippled, version at this site.

Well, there you have it. In the future we'll look at other audio DSP programs which are available. Give audio digital filtering a try in your monitoring. It's better than aspirin, or a divorce lawyer ... Come to think of it, anything is better than the latter!

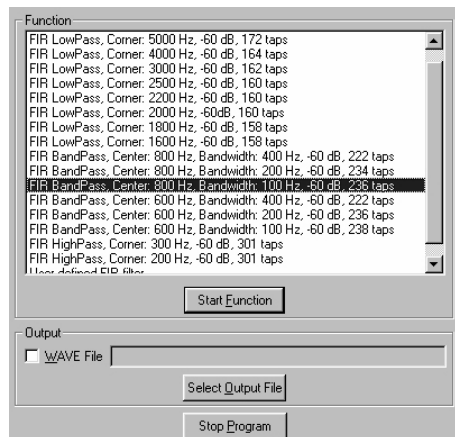


Figure 4 GNASP1 – The Filter List

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Alinco's Nifty Clear DJ-V5 Dualbander

Okay, I'll head off the obvious question at the pass: yes, I DO know that the name of this column is "Easy Access Radio, radio fun without a license." So what am I doing reviewing an amateur radio dual-band handtalkie?

The short answer is that Rachel Baughn, *MT*'s Managing Editor, said I could – largely on the argument that getting a Technician Class amateur radio license is incredibly easy. (Secretly, I think Rachel was worried that if I continued to review electronic organizers and the like, it wouldn't be long before cellular phones or metal detectors began appearing the column.)

And the point about amateur radio – at least the Technician Class – being easy access is well taken. All you have to do is pass a multiple choice test that largely focuses on operating frequencies and procedures and how to operate safely. The "tech" class license gives you access to the world above 30 MHz, including what is arguably the world's most popular ham band, two meters.

The American Radio Relay League tells me there are more than seven thousand two meter repeaters in the United States and well over six thousand repeaters for 70 cm – the so-called "440" band. With access to two meter and 440 repeaters, you can have an enormous amount of fun talking in crystal clear FM mode to hams operating on the repeaters in your local area.

The Alinco DJ-V5T is designed to operate on the two meter (144 to 148 MHz) and 70 cm (420 to 450 MHz bands). The HT (handie-talkie) features alphanumeric display, up to 5 watts power output, 200 memories, an expanded receive capability offering coverage from 76 to 999.995 MHz (cellular blocked), narrow and wide FM receive modes (AM on civilian and military aircraft bands), and CTCSS (continuous tone controlled squelch system) encode and decode.

The DJ-V5T is a relatively small HT, measuring just 2.28 inches wide by 3.81 inches high by 1.58 inches deep. The radio feels chunky and solid in the hand; it weighs nearly 3/4 of a pound. This is *not* a shirtpocket radio, but it is a very handy size nevertheless.

What really sets this radio apart – other than its exemplary performance – is its "radical chic" appearance. The entire front panel and knobs are made of clear, blue-tinted plastic. Even with

the black clamshell rechargeable battery pack hugging the back, it looks wild. With the clear blue AA battery pack attached, it looks wilder yet. Pull this bad boy off your belt or out of your pack, and you are bound to get questions. As one wag put it: this is the "ask me about ham radio" model.

◆ Looking it over

Let's take a guided tour. At the top of the DJ-V5T's front panel is a backlit liquid crystal display that acts as information central for this diminutive rig. Below that on the left side are three buttons: Power, Func/Lock, and Band/Set. To the right of that is a grill for a small speaker and another tiny opening for the microphone. The bottom band of the front panel is occupied by 16 small buttons that, typical of these small HTs, perform a variety of functions.

On the top of the radio are a pair of concentric knobs. The outer knob controls volume, the inner knob changes the frequency, memory channel, and various settings. For those of us who have older radios that feature concentric knobs where the outer one is squelch and the inner knob is volume, it takes a little while to become accustomed to the Alinco's configuration, but it's no big deal. Also on top of the DJ-V5 are the antenna (with an SMA connector) and a jack, protected by a rubber flap, for connecting a speaker microphone.

On the left side, you'll find a push-to-talk button, a MONI button that is used to set the squelch level and to temporarily unsquelch the radio, and the LAMP button. The LAMP button not only backlights the main display, but also turns on four LEDs that provide illumination for the group of 16 small buttons at the bottom of the radio.

Now, frankly, I had my doubts that these four LEDs would do anything beyond make this radio look maximally cool. But I was wrong: in the dark of the night, press the LAMP button, and the LEDs really do help to illuminate the labels around the small buttons, a useful thing when you need to do some reprogramming with little light.

The right side of the DJ-V5 is virtually naked, except for a rubber flap that peels back to reveal a jack for external DC power. The bottom surface of the case is cut square to sit with

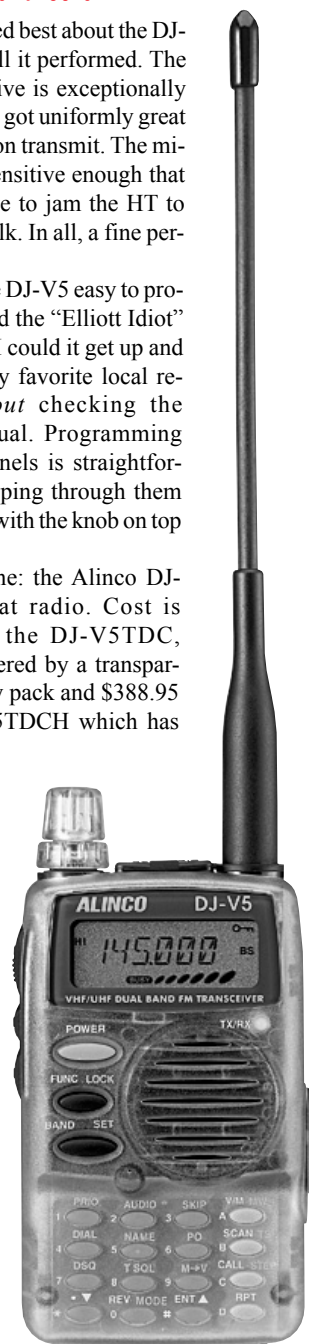
stability on a table, and there you will find a slide switch that allows the battery pack to be detached. On the back of the battery pack is a detachable plastic belt clip and a wrist strap.

◆ As good as it looks

What I liked best about the DJ-V5 is how well it performed. The audio on receive is exceptionally pleasing, and I got uniformly great audio reports on transmit. The microphone is sensitive enough that you don't have to jam the HT to your face to talk. In all, a fine performance.

I found the DJ-V5 easy to program. It passed the "Elliott Idiot" test – I found I could get up and running on my favorite local repeater *without* checking the owner's manual. Programming memory channels is straightforward and stepping through them is easily done with the knob on top of the radio.

Bottom line: the Alinco DJ-V5T is a neat radio. Cost is \$335.95 for the DJ-V5TDC, which is powered by a transparent AA battery pack and \$388.95 for the DJ-V5TDCH which has the transparent AA pack, a black rechargeable battery pack, and a charger. For more information, call Alinco at 310-618-8616; stop at your favorite amateur dealer, or inquire about cost and availability through Grove Enterprises at 800-438-8155.



- Letters continued from page 7

ways had that frequency in their radios. I don't think any local law enforcement had it in their radios during 'crystal' days. When I got Alexander County (NC) Sheriff Dept on a repeater channel I also got them licensed on 155.4750 – 'cause it doesn't cost! So I revised their channel plan and put 155.4750 as F5, and they do use it some, but their main channel is 155.4900. Since many 'scanners' in the county are very old and selectivity is poor, some listeners don't know the LE guys have changed channels. Since it is mainly for interagency/department use, I told them not to monopolize the channel and for sure not to 'BS' on it.

"The NC State Patrol does have 155.4750 in their VHF stuff but I do not know how often they use it. I do know most of the counties program into their radios the channels for adjacent counties – some will put a VHF or UHF unit in if there is a band change, but not usually."

– Dan Renfro, Hickory, NC

"I read with interest the letter to editor reference frequency 155.475 and the thought that it is very under utilized by law enforcement. Obviously no one can speak for law enforcement nationwide but speaking regionally (I live and work in law enforcement in the northern Virginia area part of metropolitan Washington, D.C.) we are one of those departments that do not and have never for the last 21 years used that frequency.

"The biggest reason being that when I joined my department in 1979 we were on UHF frequencies, four of them to be exact. A few years later we moved to eight 800 MHz frequencies, non-trunked. In order to use the 155.475 frequency it would have required us to either put a second radio in the car or a base station at our comm center and do a radio patch.

"No agency in this area uses that frequency including the state police which are in the 155 MHz band range! For mutual aid we used to use 453 MHz frequency, and yes we did patches to our 800 MHz frequencies it needed. We now use an 800 MHz frequency for mutual aid and will soon have that frequency available in all of our radios so there will no longer be a need to patch.

"The FCC has come out with new 800 MHz mutual aid frequencies, and, with at least 50% of police departments going to 800 MHz I feel that you will see a lot more interagency communication in the 800 MHz, range than you ever saw in high band, low band, or UHF. So it's not a question of law enforcement not using a particular frequency, it's more a question of whether the interagency frequency being proposed to be used is within the range of the department's current radio system. With reference to the 800 MHz channels, I submit to you the answer will most often be yes!

– Lee Williams, Fairfax County, VA PD

Digitization or Encryption?

"The word 'digital' in relation to communications is a constant source of confusion. One reader took me to task for the oversimplified manner in which I answered a question in the March *Ask Bob* column. The questioner wanted to know whether we would ever see a scanner that would allow us to listen to digitized communications. I was sure I knew what he meant – scrambling – and I answered it that way. We already have scanners that decode digitization like trunking control and DCS squelch."

"But digitization and encryption are two different things. Digitization is the conversion of an analog signal like voice and images which contain amplitude and frequency variations, to a digital stream which consists only of electrical pulses."

"Encryption, however, is the deliberate concealment of the contents of a message by scrambling it so that it is unrecognizable to an intrusive listener. If a transmission is digitized for efficiency and if it is digitized using a publicly-available code, it may be legally monitored just like any other legally-monitorable transmission. If it has been encrypted to thwart monitoring, or if it cannot be decoded without use of proprietary software, it is off limits to unintended recipients." (See June 1999 *Closing Comments* for more.)

– Bob Grove, W8JHD

Attention, Canadian non-hams

In the February issue of *MT*, Gary Webbenhurst wrote a review article exhorting the ICOM 32A as a scanner. He says, "A Canadian reader reminded me that amateur transceivers are illegal for non amateurs in Canada. Other countries may have similar restrictions. Since our readers are literally around the globe, I urge you to check your local laws concerning the use and possession of radios and scanners."

– Gary Webbenhurst AB7NI

The very flexible ScanCat

"Can Software Simplify the AOR AR-8200?" was the subject of the March *Computers & Radio* column. One of the three programs tested by Catalano was ScanCat's version 7.50, which did enable complete scanning control, but with a substantial sacrifice in speed. Jim Springer, president of Computer Aided Technologies, wished to point out that the user does have more options than were addressed in the short review.

First: although ScanCat uses a lot of the computer's resources when controlling a scanner (the AR8200 in particular), several optional controls can allow the user the remaining resources for other tasks – For example, using the "tiny" level on the minimize button will reduce the resource load.

Second: ScanCat has three selections for port resources. By using either the 2nd or 3rd

option many of the resource problems may be relieved.

"There are a lot of setup choices in ScanCat; therefore, we depend on the manual as well as our on screen help to get the best performance from our software. While John's review has some valid points, these are addressed in the manual."

Jim adds, "In the future we will be moving ScanCat to a thirty-two bit program which will further reduce the computer's resource load under Windows."

Millennial Musings

"Regarding Bob Grove's 'Millennial Musings' in the February *Closing Comments*, the parasitic elements who manipulate us with misinformation and prey on peoples fears, etc. are defined by the Clinton era ... In all reality the Clinton mentality and its followers need the Rex Humbard mentality and followers and vice versa. They complement and feed off each other ... There is not one speck of difference between Bill Clinton and Brother Stair. There is not one speck of difference between James Corville and William Cooper. They are both bigots and bottom feeders. There is no place in American society for either of them.

"However, there is no place for the government to control speech. We must take the good with the bad to maintain our democracy ... The Constitution does not protect the gullible, nor does it give the plunderers free rein. It protects our freedom of speech and freedom of religion, or the freedom of no religion – whatever one chooses.

"The government is very seldom benign. It may begin that way, but always progresses to ... the lowest common denominator. So I think as bad as religious plunderers are and as reprehensible as political bottom feeders are, we must never allow them to gain control of our lives by edict or rule of law ...

"Let us keep the government out of our lives as much as possible. Let us keep them totally out of our radio shack. Let's tell Billy Tauzin to fly a kite. Let's put aside cellular telephone profits and tell them to be responsible and compete honestly. Keep the thought police away."

– T Jones, Plankinton, SD

Bill Cheek

Longtime *MT* columnist and scanner enthusiast Bill Cheek is likely in his last days, according to his wife Cindy Cheek. Bill has had eight mega-doses of chemotherapy, but the cancer has spread throughout the brain. Cindy said letters and cards from friends and supporters would be very welcome at PO Box 262478, San Diego, CA 92196.

We welcome your **Letters to the Editor** at PO Box 98, Brasstown, NC 28902 or via e-mail to mteditor@grove-ent.com.

– Rachel Baughn, Editor

Sangean ATS 505: friendly sidekick for travelers

Right out of the box, the Sangean ATS 505 hits you with a rich, warm sound, especially through headphones, the moment you tune in a strong shortwave broadcast or local FM station. The control panel is simple and well designed with large buttons that are easy to see. A large digital display is visible at a glance, and can be lighted with the push of a button. This is a very easy and pleasant radio to operate.

◆ Coverage

The ATS 505 covers 153 to 297 kHz (low band), 520 to 1710 kHz (medium band), 1711 to 29999 kHz (shortwave), and 87.5 to 108 MHz (FM). The bands are selectable via a button on the keypad.

There is a single sideband (SSB) feature that enables you to hear single sideband transmissions. Sangean calls this a “clarifier.” It is a thumbwheel on the top left side of the receiver. The wheel has a click stop at center position.

To hear an SSB station, you must first flip a switch on the side of the receiver from AM to SSB. It helps greatly to set the receiver to Fine Tune. The main tuning dial will then step up or down in 1 kHz increments. Fine tune does not work with the up-down tuning arrows. They move the frequency only in 5 kHz steps.

When you find an SSB station, you can tune it in with more precision by turning the clarifier left or right of center, depending on whether the station is transmitting on upper or lower sideband. The clarifier is sort of a cross between a band spread and the BFO (beat frequency oscillator) adjustment that we all loved to hate on older radios.

Using this feature, I was able to hear utility stations, but found the quality to be mediocre. Voice stations sound unnatural and are difficult to understand. There is an annoying warble on CW (Morse code), but you can still make out the dits and dahs. So the SSB mode does work.

But you should not expect to do serious utility or broadcast DXing with this radio, unless

you enjoy frustration. Trying to ferret out flyspeck stations or weak utilities with 1 kHz tuning and the clarifier is not easy.

The ATS 505 has no signal strength meter. The presence of a station is announced by sound from the speaker and the glow of a light-emitting diode on the control panel. But there is no indication of signal strength to use as a reference point

The radio is powered by four AA cells (not included) or an optional 6 volt AC wall adaptor.

◆ Tuning

You can enter frequencies directly via the key pad, or step up or down to a frequency with the tuning knob or up-down tuning arrows. The tuning knob is conveniently located on the upper right side of the receiver. The knob has a solid feel and there is no clicking as you tune from one frequency to another. It steps up or down in 5 kHz or 1 kHz increments.

While in shortwave mode, a button on the keypad quickly jumps you to each of the “meter” bands. This is super handy when a broadcast station announces that it is ceasing operation on one band and switching to another. Only if your eyes are extremely good or you have very strong glasses, will you appreciate the tiny list of bands and associated frequencies at the bottom of the display window also found on many other Sangean portables.

The ATS 505 has an auto preset system that automatically finds and memorizes the strongest AM, FM, and LW stations available in your area.



in doing reception reports.

◆ Broadcast and portability

This radio's strengths are in its portability and its pleasant sound in receiving broadcast stations. An earphone jack may be accessed as well, and stereo ear buds in a soft carrying case are provided.

The built-in, telescoping antenna and apparently sensitive front end does a good job of pulling in moderate to strong shortwave broadcasts and local AM and FM stations. There is an external antenna jack which disconnects the built-in antenna when you insert an external antenna. I plugged in my 70-foot outdoor long wire antenna and noticed very little difference in apparent signal strength over the internal antenna. If anything, the internal antenna sounded better, producing less noise and greater clarity.

◆ Amenities

The receiver has two built-in clocks — a very nice feature — that are easy to set. What's more, you can do it while tuning in WWV for super precision.

Another nice feature, especially for a receiver in this class, is the memory system. You can store up to 45 frequencies — 18 in two switchable “pages” on the shortwave band, and nine each in the FM, MW, and LW bands. When you store a frequency, a corresponding number (from one to nine) for that frequency appears in the display window. You can recall a frequency simply by pressing the corresponding number button on the keypad. This works very well.

The zero button on the keypad toggles memory scan on and off, but the scanning process is very, very slow. The radio stays on each

memory station for about seven seconds before going to the next one.

There is no output jack for a tape recorder; however, the receiver does have a timer that will turn on the radio at a preset time. This can be used to turn on the radio at a preset station for a voice-activated recorder placed near the speaker. Or you can use it to awake to your favorite short-wave or local radio station. In fact, Sangean calls this an "alarm."

◆ Documentation

I did not receive an instruction manual with the test receiver, so I cannot comment on documentation. But one of this radio's strengths is its simplicity of operation and almost intuitive design. A manual is almost unnecessary.

A minor point: while the keypad buttons are large and easy to see, they seem not to respond quickly, at least on the radio I received for test. If you punch them quickly, they do not always work. Pressing them slowly seems to work much better. This is different from other Sangean receivers I have used.

◆ Bottom line

A sage old Navy radioman once told me that all radios are good...some are just better than others. The value of a radio is directly proportional to its ability to do what you want it to do. If you want a receiver that does everything, make friends with a banker. The alternative is to buy a receiver that offers just those features that you want.

The Sangean ATS 505, with its pretty face, friendly demeanor, and handy 5 kHz step tuning, clearly wants to hear shortwave broadcast stations. For many SWLs, that's the bottom line. This radio does that, no question. Its equally strong performance in receiving local AM and FM stations is a bonus. So is its small size and portability.

If that is what you are looking for in a receiver, then the ATS 505 will serve you well. It's available for \$129.95 from Grove Enterprises or check with your closest dealer.

About the Reviewer

Although Wayne Mishler has been a columnist for both *Monitoring Times* and *Satellite Times*, we thought it might be of interest to reprint a little of his approach to performing a product review:

"I am no engineer, but I do love radios and radio communications. I started taking radios apart and putting them back together at age 15. I began studying electronics while in the Navy, became a ham radio operator in 1977 while stationed at New Orleans Naval Air Station, and have been troubleshooting, aligning, and repairing Drake tube-type gear for several years.

"I know how to find my way around on HF, in broadcast and utilities, and how to get the most out of a radio in real life. I own a well-equipped

Drake amateur radio station, including three scanners, an R8 and a recently purchased Drake SW2.

"I think a reviewer should recognize that there is a human side to a radio. Certainly things like sensitivity and signal-to-noise ratio are important. But to me the most important criteria is how well the radio responds to the average operator in real-life performance – not an engineer measuring parameters that the average operator will never hear. I am more interested in: What can the radio hear? How does it sound? How easy is it to use? How will it help me hear more

stations? What are its conveniences and inconveniences in operation at the listening post? And yes: how pretty is its face?

"When necessary, other engineers will give hard numbers regarding signal to noise ratio, S-meter response to microvolts of signal, passband shape, dynamic ratio, and the like, while I will try to come up with a word picture of how the test gear would really work at the reader's fingertips."

We look forward to Wayne's upcoming review of the Palstar R30 shortwave receiver.

More than just radios....

You probably know all about the great value **ADI** brand transceivers, but **PRYME Radio Products** makes more than just radios. In fact, we manufacture a full line of aftermarket accessories for all kinds of radios, not just our own! Our line includes accessories for Kenwood, Icom, Yaesu, and many more! From Family Radios, to scanners, to amateur or commercial handheld radios, we have the right item for the job. Our accessories are reliable, innovative, and affordably priced.

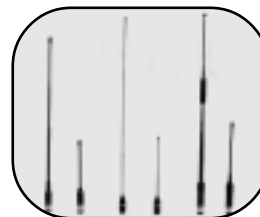
Audio Accessories

Our innovative audio products have made us famous. From the comfort of our SPM-400 mini-boom microphone to the low-profile of our EH-1 "invisible" ear phone and SPM-700 surveillance mic, we have the right accessory for the job!



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Most stock antennas for scanners or portable radios are extremely poor. Upgrading to a better antenna can make a huge difference in performance. Our antenna products are specifically designed for maximum performance and durability.



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We offer many models of rechargeable battery pack for today's most popular handheld radios, as well as a number of portable "power stations" for those who need "power to go."



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Radio Shack PRO-94 Portable Dual Trunking Scanner

Radio Shack offers two new trunking portables of note for year 2000. The \$350 PRO-92 is manufactured by GRE and is able to track several types of trunked and conventional systems in sequence (see Jan. 2000 *MT*). The \$300 price tier is occupied by the new PRO-94, manufactured by Uniden in the Philippines for Radio Shack.

There are more differences between the PRO-92 and PRO-94 than similarities. The PRO-92 can scan a mixture of conventional and trunked systems at the same time, including LTR systems, has PL and DPL decoding squelch and readout, a computer port, and alphanumeric text labels. The PRO-94 lacks these features.

The PRO-94 tunes the upper portion of the 10 meter ham band and the standard "scanner bands," as well as 806 - 956 MHz, and a sliver in the 216 - 225 MHz range. The 1240 - 1300 MHz range is included, but at reduced sensitivity. Trunking coverage includes Motorola type I (800 MHz), type II (VHF, 400, 800, 900 MHz), and Ericsson EDACS systems.

The Pro-94 also functions as a "weather alert radio," displaying SAME messages. You cannot program FIPS codes for your location as you can in the more weather-savvy Uniden BC278CLT base scanner (see Nov. 1999 *MT*).

Powering the PRO-94 is simple – insert four AA batteries: two in the body of the radio and two into the battery cover. There's no "speed loader" battery tray as found the PRO-92 or PRO-43. Batteries and AC power supply/charger are not included.

A keystroke sequence can disable the confirmation beep as well as the battery saver circuitry.

♦ Memory

The PRO-94's 1000 channel memory is divided into A and B partitions, a design we haven't seen since the old Electra Bearcat BC 20/20. Each partition provides 500 memory channels in 10 banks, numbered 1 - 10. Banks can be designated as either conventional or trunking, but not both simultaneously.

The large number of memory channels is attractive, but you must program them by hand because the PRO-94 provides no computer port. It lacks a query facility, as found in the Uniden BC245XLT, so you won't be alerted if you program the same frequency in multiple channels.

There are 10 monitor memories you can use for temporary frequency storage and they are common to both the A and B partitions.

With the exception of selecting the A or B partition, programming the PRO-94 is reminiscent of earlier models. You first choose trunking or conventional, then press the Program button. Each conventional memory channel is programmed with a frequency and an optional delay flag, then pressing Enter.

Programming a trunked frequency requires you to choose the trunking technology, a bank, the frequency, then press Enter. Programming a Type I or hybrid Motorola trunk system is more complicated and requires entry of a fleet offset. In addition, you must program a frequency offset for VHF and UHF Motorola trunked systems.

♦ Scanning

For trunking, one can program five talk group lists of 10 IDs in each of the banks. Talk group lists can be enabled or disabled for scanning purposes. This is more flexible than the PRO-92 talk group scheme, which supports only one list per bank. You can lock out talk groups from these lists and conversations in these groups won't be scanned.

A defeatable rescan delay causes the PRO-94 to hold the current talk group for 5 seconds after the end of transmission before resuming the scan. The delay is global to all talk groups. A 2-second rescan delay can be assigned to each memory channel for conventional scanning.

Within the A or B partition, memory banks can be sequentially scanned in combination. You cannot scan banks from both partitions at the same time, nor can you scan conventional and



trunked banks at the same time. Like the BC-245XLT, there's a 5-second latency when scanning talk groups in two or more trunked systems. That is, our PRO-94 will not scan the next trunked bank until there has been no activity in the current trunked bank for approximately 5 seconds.

While scanning trunked systems, you can instruct the PRO-94 to "camp out" or hold on a particular talk group. A keypress sequence causes the display to alternate between talk group ID and frequency while trunking.

One ID in each talk group list may be marked as a priority ID and the PRO-94 will check those talk groups more frequently for activity when trunking. You can designate one channel per bank as a priority channel for conventional scanning and the PRO-94 will check the priority channels every 2 seconds.

♦ Searching

The PRO-94 supports direct search, a limit search with one pair of frequency limits, and a service search. The direct search is handy – type in a frequency, press the up or down arrow key and the PRO-94 takes off. Service search categories include weather, ham, aircraft, marine, and police (fire and emergency). Sorry, railfans, there's no railroad category.

Up to 20 frequencies may be locked during a search. There is no auto store feature.

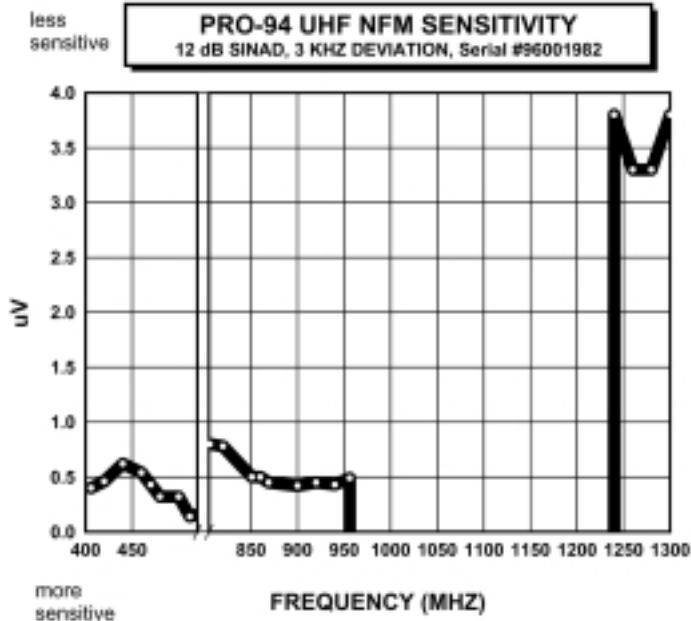
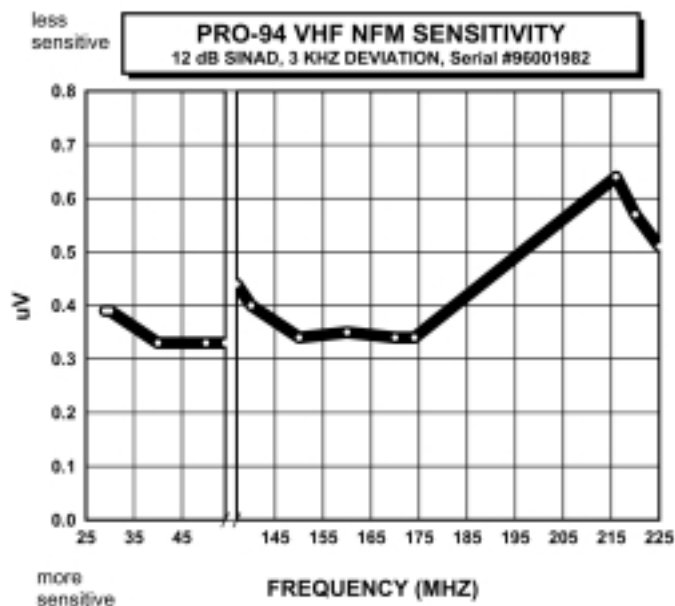
♦ Performance

Our PRO-94 (s/n 96001982) is a fairly sensitive radio, except in the 1240 - 1300 MHz range (see graphs). It has only eight birdies strong enough to open the squelch: 407.7625, 407.8125, 413.175, 413.225, 899.2375, 906.4125, 906.5875, and 1290.7 MHz.

Our PRO-94's audio becomes distorted starting at lower volume levels. There's a bit too much treble, which accentuates the hissing noise on weak signals.

We purposely tortured the PRO-94 by driving through a problem area filled with cell phone and PCS base transmitters. We had problems with images and desensitization.

While our PRO-94 has excellent image rejection on most bands, cellular phone images batter the AM aircraft band when we are 1/4 mile from the cell phone towers. We hear no cellular



Measurements

Radio Shack PRO-94 Scanner S/N 96001982

List price \$299.99

Tandy Corporation
Fort Worth, TX 76102

Frequency coverage (MHz):

29 - 54 (5 kHz steps)
108 - 137 (AM, 12.5 kHz steps)
137 - 174 (5 kHz steps)
406 - 512 (12.5 kHz steps)
806 - 823.9875, 851 - 868.9875
896.1125 - 956 (12.5 kHz steps)
1240 - 1300 (12.5 kHz steps)

Sensitivity: see graphs

RF attenuator: none

FM modulation acceptance: 13 kHz

Intermediate Frequencies: 380.7,
10.85, 0.45 MHz

Image rejection:

41 dB at 50 MHz
60 dB at 155 MHz
78 dB at 860 MHz

Audio output power at earphone jack:

175 mW @ 10% distortion into 8 ohms

Practical memory scan speed: 63 ch/sec.

Search speed, Turbo: 182 steps/sec.

Search speed, regular: 65 steps/sec.

Current consumption at 6.0 VDC:

off - 0 mA
manual - 76 mA
scan - 78 mA
full volume - 153 mA
Battery saver: after 5 sec. in Manual.
Low battery warning at 4.54 VDC or less.
Shutdown at 4.27 VDC or less.

images while using a rooftop antenna at home.

Cell base station transmitters desense our PRO-94, sometimes causing it to "lose" the data channel of a nearby trunked system. The PRO-94 locks solidly onto talk groups when used in other areas.

Paging intermod is a problem in the 160 - 165 MHz range and TV audio breaks through in the 418 - 430 MHz range when connected to our outdoor antenna.

The top mounted squelch and volume knobs are easy to grasp and the backlight illuminates the PRO-94's display better than in the PRO-92.

Overall

The PRO-94 is a solid scanner, but not competitive at \$299.99. The 300 channel Uniden BC-

245XLT has an attenuator and computer port, can scan conventional and trunked systems sequentially, includes a proprietary NiCd pack, and may be found discounted near \$220. If you elect to buy a PRO-94, shop around or wait for a sale.

RadioMap™

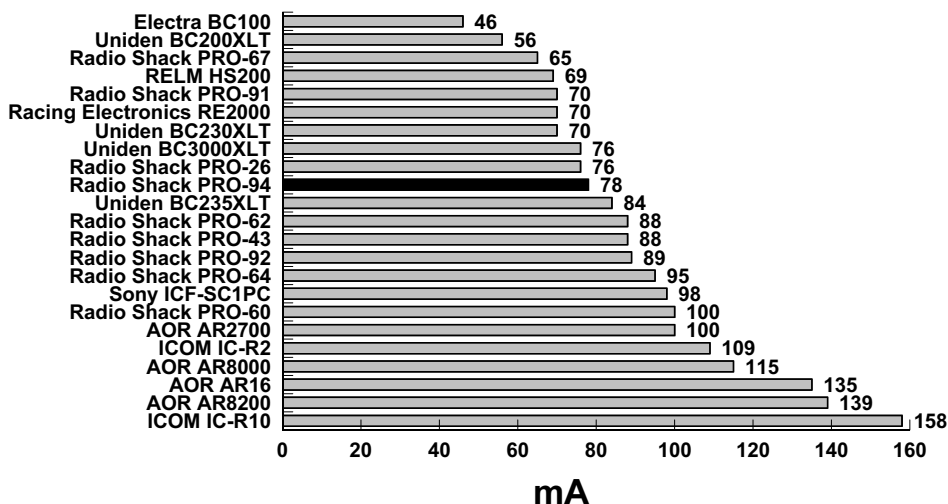
Transmitter sites in your area are researched and marked on a beautiful 11 x 17 full color plot. See FCC licensed sites from VLF through microwave plus selected FAA transmitter sites. Callsigns, frequencies, and names provided. Ham radio stations excluded. You choose the map center location - anywhere within the United States. We adjust map coverage for best readability. Deluxe report includes additional index by frequency and local spectrum occupancy chart.

Used by radio professionals and hobbyists since 1994 for identifying towers, sources of radio signals, interference, etc. Send nearest street intersection for map center and check for \$29.95 or \$39.95 (Deluxe report) payable to Robert Parnass.

Robert S. Parnass, M.S.

Radio electronics consulting
2350 Douglas Rd., Oswego, IL 60543-9794
www.megsnet.com/parnass

Portable Scanner Current Consumption Measured While Scanning



Note: One sample of each model tested.

Copyright 1999, Bob Parnass, AJ9S

Ten-Tec RX-340

Unknown to most shortwave listeners, in the past few years Ten-Tec has produced a number of commercial and military grade receivers. The currently produced rack-mounted RX-331 (website: www.tentec.com/rx331.htm) model is intended for remote control only.

The new RX-340 uses the time-tested circuit boards of the RX-331 and adds a new cabinet with a comprehensive front panel. The RS-232 interface is retained, and the command language is published in the manual so users can write their own software.



The RX-340 front panel reminds us of the BAE WJ-series receivers. There are enough knobs and switches to satisfy the most avid dial tuner.

So what is the RX-340? It certainly is not a product for the newcomer to the shortwave bands. Nor is it a receiver for the program listener expecting a clock to control a recording device.

The receiver is a multi-mode, general coverage synthesized receiver utilizing military-grade digital signal processing (DSP). It tunes from 5 kHz to 30 MHz in steps as fine as 1 Hz. All displays are blue/green vacuum fluorescent.

The press release goes on to say "High dynamic range analog stages provide 1st, 2nd and 3rd IF (and 80 dB of AGC) - everything else is accomplished in DSP including all mode detection, IF filters, AGC, (remaining 40 dB), adjustable BFO, passband tuning and noise blanker."

There are 57 IF bandwidths from 100 Hz to 16 kHz and all filters have a shape factor of 1.5:1 or better. Modes are USB,

LSB, ISB (independent sideband), CW, AM, synchronous AM and FM. In addition to the fast, slow and off AGC modes, there is a interesting fourth user-programmable AGC setting that includes setting the attack, hang and decay rates.

Memory and scan functions include 100 memories that retain the frequency, mode, IF bandwidth and BFO setting. There are a variety of memory scan options to select from.

The stability of the receiver is rated at +/- 1 ppm across the operating range of 0 to 50 degrees C.

There is an IF output, post DSP, at 455 kHz, and two signal monitor outputs, one at the AGC stage and the other at the 2nd mixer. The three outputs should satisfy the technical hobbyists attaching other devices to monitor and process signals.

The RX-340 is designed for a standard 19-inch rack mount and is 5 1/4 inches high, weighing 12 1/2 pounds.

At deadline, the RX-340 information was not yet posted on the Ten-Tec Web site at www.tentec.com/, but it may be online now. Review the RX-331 Web page for a comprehensive listing of the RX-340 performance specifications, or watch for the review in *Monitoring Times*.

The price of the RX-340 is estimated to be approximately \$4,000, about \$1,000 less than the comparable BAE WJ-8711A receiver. The first RX-340 units are expected to ship in May 2000.

The RX-340 will be available from Grove Enterprises: call 800-438-815 for more information, or



A view of the inside of the RX-340, from the top.

contact Ten-Tec at 1185 Dolly Parton Parkway, Sevierville, TN 37862. Their information hotline is (865) 453-7172; fax (865) 428-4483.

— Tom Sundstrom, W2XQ

Ramsey Shortwave Receiver Kit

"Learn by doing" is a tried-and-true educational technique, but many would-be homebrewers are too nervous to take up the soldering iron that first time. Ramsey Electronics has the solution; their kits have been tested over the years by school kids, Boy Scouts, and hobbyists of all ages. Before you try your soldering skill on an expensive investment or a valuable antique, why not try this simple shortwave receiver kit?



The SR-1 is a very sensitive (about a microvolt!) receiver. The superheterodyne design includes automatic gain control (AGC), radio frequency gain control, and plenty of speaker volume using any speaker or earphone. Smooth varactor diode tuning allows you to tune any 2 MHz portion of the 4 to 11 MHz frequency range. The kit runs on a 9 volt battery (not included). A matching custom case and knob set are available to give your radio a finished look.

The SR-1 shortwave receiver kit is \$29.95; the matching case and knob set (CSR) is \$14.95 from Ramsey Electronics, 793 Canning Parkway, Victor, NY 14564; Phone (716) 924-4560; www.ramseyelectronics.com

Plotting W1AW Solar Data

Scott Craig has written some interesting freeware computer utilities which he distributes through his web site. Most programs involve such things as achieving proper balance in your aquarium. Of interest to radio hobbyists, however, is a program he's written for those interested in solar cycles and solar data.

Using propagation forecast data by Tad Cook, KT7H, (transmitted by the American Radio Relay League on W1AW and also available from www.arrrl.org or via email subscription), daily sun spot and 10.7mm solar flux values can be plotted graphically to see trends in the solar cycle. This application can be used to plot the information in a graphic format on your screen.

Three versions of Scott Craig's software are available for downloading, varying in complexity from DOS to a Windows 95 version, which is basically a 32-bit version of the Windows 3.x application. Updated data is also available periodically from the web site at <http://edge.net/~scraig/>.

Dedicated to the BC895XLT

A programmer/scanner buff has developed a freeware program for use with the BC895XLT only which he is offering for free download from his web site. BandTrol provides a bandscope for the Uniden BC895XLT scanner which will run on Windows 95, 98 or NT.

The operation manual as well as the base program release and the current upgrade (1.2.0) are available free on the distribution site at www.geocities.com/dfw1417. A new program called SofTone provides CTCSS Tone Detection and Logging for the BC895XLT. SofTrol combines the tone detection with a built-in band scope. These freeware programs do not support trunking mode.

Scanners Stream to the Net

For great police scanning nationwide, there is getting to be only one place to go — www.apbnews.com! This website is dedicated to crime, justice, and safety, and in addition to its remarkable staff of reporters and journalists, it includes live audio from police communications in 27 major cities across the nation!

APBnews spokesmen say it is their goal to eventually stream audio from every major city in the U.S. We'll tell you more about this unique website in an upcoming issue, but meanwhile, tune in to APBnews.com and listen in for yourself. You'll want to bookmark this one!

Gordon West License Manuals Updated

Three new amateur radio license manuals have been released in time for the newly restructured classes and the revised question pool. The books cover all questions and answers, with a description of the correct answer so the student learns as he goes. All are well illustrated and include chapters on operation, privileges, propagation, etc. appropriate to the bands on which the upgraded ham will be entitled to operate.

West's new 6-tape code course prepares students to learn the code Farnsworth method and easily pass the 5 wpm code test. Tapes are also available for commercial radiotelegraph test preparation. A new 492-page General Radiotelephone Operator License plus Ship Radar Endorsement test preparation book was updated this year.

All books are copyright Master Publishing, Inc., and are sold by Radio Shack stores, the W5YI distributor in Dallas, Texas (800-669-9594; see ad in MT), and ham radio dealers.

Next Best Thing to an Elmer

If you're one of those people who just has to see it to understand it, Alpha Delta has a video and book on ham radio that may be just what you needed. Or, it could be what you need for that ham class you're teaching.

Basic Technology for the Amateur Radio Enthusiast is not a study guide for a specific license, but it is a support program for other courses. The video shows how radio waves are formed, explains basic technical terms, and even takes you on a walk through a receiver printed circuit board. The book is designed for the non-technical person interested in joining the hobby.

Basic Technology video/book program is \$39.95 plus \$5 s/h from Alpha Delta, PO Box 620, Manchester, KY 40962; 606-598-2029 or toll-free 888-302-8777; www.alphadeltacom.com

Hands-free Cellphone

Dozens of cities and at least 23 states are currently considering laws to restrict use of cellular phones while driving to hands-free operation only. Three cities have already passed such legislation.

So Mercedes-Benz is right on target with its 2000 models which offer US drivers the digital Motorola StarTAK cellular system integrated into the design of the car. StarTAK is available for CDMA or TDMA service and has dual digital/analog capability.

Control is performed using the dashboard display and steering wheel controls. To reduce distractions, audio from the radio or CD player is au-



tomatically muted during a call. If you don't choose to purchase the optional voice-controlled radio or hands-free audio package, however, better be prepared to pull over to talk.






TIMESTEP

If you own an ICOM PCR1000, all you need for Weather pictures is an antenna, a preamplifier and a TIMESTEP interface for your computer.

If you would like to see colored weather images as they move across the United States and Europe, call or email us. It is easier than you may think. With a dish looking out a South facing window, a Feed, an LNA, a Timestep Receiver and Timestep Interface, your computer and you are ready to receive these kinds of images.



U.S. GOES/WEFAX IMAGE



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MT REVIEW

Low Cost Hardware for GOES Reception

- by Lawrence Harris -

My backyard comprises a dish and antenna farm, but nothing stays in one place for long. One day the washing line/mast support has a vertically polarized log periodic antenna fitted at the top for monitoring satellites; the next day this may be replaced by a multi-element yagi pointing at GOES. For the last few days it has supported a VHF antenna that is pointing upwards, then westwards, now southwards (for testing polar satellite reception). Meanwhile, the dishes on the ground get moved about, dependent on test requirements.

The units that I have recently had under test comprise an active feed and a downconverter. In isolation, these components are unlikely to be of much use to anyone, but as new additions to a weather satellite (WXSAT) system, they are invaluable. This article provides the background to their use as the essential parts of a low-cost GOES WEFAX system.

◆ Starting from scratch

The newcomer to monitoring satellites has a bewildering choice. The cheapest systems are likely to be commercial satellite television receivers, where bulk production means lower costs. However, thanks to NOAA (the National Oceanic and Atmospheric Administration) we also have several weather satellites that provide interesting alternatives! There are two different groups of satellites (constellations) available for monitoring. I suspect that most WXSAT monitors started with the polar orbiters – currently NOAA-14 and NOAA-15. These (as the type suggests) orbit earth in near-polar orbits, and therefore pass over every point on earth three or four times each day.

To receive signals from these WXSATs, you need a suitable 137 MHz band antenna and receiver. The units must be specifically designed for WXSAT use; general purpose utility antennas and receivers are unsuitable due to the special nature and content of WXSAT signals. Forget the discone; although these allow you to tune to the 137 MHz band, special characteristics (for example, the NOAA WXSATs provide right-hand circular polarization) mean that reliable reception may be limited to an occasional minute during high elevation passes. A crossed-dipole,

turnstile or quadrifilar helix antenna are amongst the most popular choices for reception. WXSAT receivers are also highly specialized, requiring a wider-than-normal bandpass, together with tight filtering for optimum reception.

Perhaps you have a complete polar orbiting WXSAT set-up and have been monitoring NOAAs-14 and -15, in addition to Resurs 01-N4 and Meteor 3-5. What else do you need for GOES reception? Two – maybe three – items. Before I detail these, let us take a brief look at history.



Dishes for GOES

I use the larger dish for receiving Primary Data; it was originally used for C-band reception. The smaller dish carries the active feed for GOES WEFAX (or Meteosat-7) reception.

◆ Compatibility

There are grounds for being grateful for decisions made decades ago. Despite their significant differences in operation, the decision was made to provide a satellite downlink of low-resolution imagery from geostationary weather satellites in a format compatible with automatic picture transmission (APT). This is the image format of the polar orbiting WXSATs. Both types (with few exceptions) provide low resolution pictures in which image data is amplitude modulated on a 2.4 kHz carrier. The image data is a signal representing the measured brightness of a small component of the scene below the satellite.

This modulated carrier then frequency modulates the main radio frequency carrier. In a visible-light image, high modulation means dark levels (sea), and low modulation means white (cloud). Land generally falls in an intermediate range of gray levels.

This unique form of signal processing is the reason that receivers of special design are essential for good reception, and means that a system that can receive and produce pictures from most polar orbiting WXSATs, can also produce them from geostationary WXSATs – including Meteosat-7 for European users, and GOES for American users. The only compromise is that a receiver for polar orbiting WXSATs normally has an intermediate frequency (i.f.) bandwidth a little wider than that required for geostationary WXSATs – to allow for Doppler effects. Doppler effects are not observed from geostationary satellites – under average conditions!

◆ What extra equipment do you need?

These two components – the active feed and downconverter – cannot achieve much on their own (or even together). They are designed to be additions to a polar orbiter receiving system that will already include a 137 MHz receiver and decoding system. Such receivers sometimes include an additional connector for 137.5 MHz to take a feed from a downconverter.

You also require a suitable dish to receive the signal. Contacts tell me that supplies of old Primestar dishes are often available for the taking, due to obsolescence. Even if such a dish is unavailable, a home-made dish should not be out of the question. When I first decided to set up a receiving system for 1691 MHz back in the mid-1980s, buying a dish was impossible. Satellite television was in its infancy and such dishes were very expensive. I decided to construct my own, after realizing that at this frequency, surface accuracy was a minimal problem – imperfections of over 1cm were acceptable! I built a 1m diameter dish using chicken wire, supported by a wooden frame. I fitted a downconverter, and immediately found a signal from METEOSAT – Europe's geostationary WXSAT.



Fig 1: active feed in use

Figure 1 shows how the active feed should be fitted. It is designed for offset dish use – an unusual concept in WXSAT applications! The unit has a cylindrical section that can be fixed by clips to the dish's feed support. The back face of the box – see figure 1 – receives the incoming 1691MHz signal from GOES, and is effectively impervious to rain – even for sustained periods. The feed receives power along the output cable, so a separate feed is not required. After fitting the feed to the support, it has to be set to provide maximum signal strength. This is done by carefully adjusting its exact position with respect to the dish. This may take several minutes to align and adjust for maximum signal.

Software is required to decode the telemetry. The necessary facilities are almost certainly included with your current NOAA-Meteor-Resurs program; look for a GOES option.

◆ Component 1 - the Active Feed

My original feed for 1691 MHz reception was passive; it consisted of a cylindrical feed fitted with a small dipole. Because of the low signal strength, I had to fit a microwave amplifier. This new “active feed” device is almost revolutionary in providing a signal suitable for direct input to a downconverter without the need for a preamp. This is indicated by its specification:

Specification

Feed gain 6.0 dB

Preamplifier gain 14.0 dB (giving a total gain of 20 dB)

Noise figure <0.5 dB

Voltage supply 6 to 16 Vdc at 20 mA current.

The majority of system noise is added at the first stage; this active feed provides 20 dB gain with no more than 0.5 dB noise figure.

Price \$89 ex postage

◆ Component 2 – the Downconverter

Downconverters are commonly used in radio ham environments; this unit converts the amplified 1691 MHz signal from the active feed into a 137.50 MHz equivalent for transport to the receiver. It is a work of art! The input connector is a standard N-type plug for use at 1691 MHz; the output is an F-type socket. Little is likely to go wrong with it. It should be given protection from the elements by fitting in a small enclosure to keep out rain, especially around the connectors.

Specification

1691 MHz input, 137.50 MHz output

Gain 33dB nominal with 2dB nominal noise figure

Power input 6 to 16V d.c. at 40mA nominal current

Power output (if selected) 50mA at the N-type socket for powering the active feed

Price \$135 ex postage

◆ Switch-on and locate GOES

For testing purposes, I used a small off-set dish in order to provide worse-case conditions – those possibly met by anyone confined to using a small dish. Setting up required the routing of cable from the dish/active feed to the downconverter, and then indoors to the computer. A 5m length of cable is supplied for the feed to downconverter, and this should be used without cutting or other modification. You will need to provide cable for the 137 MHz run; the specifications provided with the system suggest that up to 100m of either 50 or 75ohm cable can be used. I fed some low-loss 50ohm cable through already-prepared feed holes leading to my computer room.



Fig 3: downconverter

The system worked from switch-on. The dish has to be pointed at the satellite, and this can readily be achieved by monitoring audio from the WXSAT receiver. Two satellites are available – GOES-10 is located over longitude 135 west, for west coast coverage, and GOES-8 will be found at 75 west, for the east coast. A helper can be invaluable for the process of either adjusting the dish position or monitoring the audio – but I achieved this on my own, so help is not essential.

◆ Results

My backyard is in Peverell, Plymouth, UK, so I used the system on Meteosat-7 – the equivalent of GOES-8. A look at the transmission schedule for GOES-8 and GOES-10 shows a near continuous sequence of images from not only the original GOES satellite, but also images originating from Meteosat-7, NOAA-14, and the other GOES.

The schedule ensures that formats of specific regions are transmitted at regular intervals. Because these have identical content (only the clouds have moved!) they can be animated. Software normally has an “animation” facility, and this provides the best guide to nowcasting and

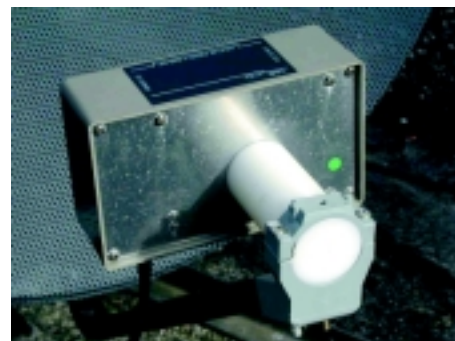
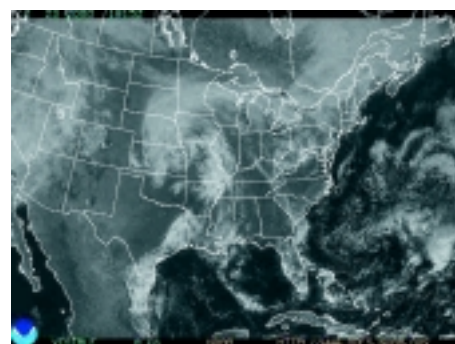


Fig 2: active feed

Figure 2 shows a close-up of the active feed mounted in a clamp on the feed support.

forecasting that can be obtained. Even using the three-hourly images from GOES-8 that are transmitted by Meteosat-7, Europeans can monitor weather changes over America, as shown in this GOES image.



With all satellites, you either receive them near-perfectly, or they are of little interest. No-one wants to view noisy images, or to have to spend time using software to “clean” them. This system provided virtually noise-free images throughout the test period. One minor “hiccup” happened when a gale blew the dish a few degrees in azimuth, causing enough signal loss to suggest that the system had failed because of the rain. Close examination immediately revealed that the pointing was several degrees off. Re-adjustment corrected this and the system continued to operate flawlessly. For permanent use, it is advisable to fix the dish to the ground, rather than merely resting weights on the mount support legs as I did!

The pricing of these units brings GOES WEFAX imagery right into the domestic market. Fifteen years ago I paid the equivalent of over \$200 for a downconverter, and the system also needed an expensive preamplifier. It is encouraging to see such products arriving at these prices.

◆ Availability

The two units (feed and converter) are manufactured by Timestep Weather Satellite Systems and retailed by Swagur Enterprises. Contact them on phone/fax 608-592-7409. Web site: www.swagur.com and check-out the Timestep site at: www.Time-step.com

Prices given above were those applicable at the end of 1999; please check in case of changes.

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By Bob Grove,
Publisher

Do Citizens Have the Right to Listen to Public Service?

Readers who recall our March 1999 editorial know that our opinion, based on the Communications Act of 1934 and subsequent law, is that listening in to public service agency communications is a privilege we are specifically allowed, not a right to which we are entitled. But we are also aware many others do consider it a right -- among them scanner buffs, persons from the media, and even some lawyers.

Following is such an editorial written by Chris Boyd, managing editor of the *Palos Verdes Peninsular News*.

Freedom of Listening Is Our Right, or "1 Adam 12"

- By Chris Boyd -

Did anyone read the *Los Angeles Times* Metro section recently? It has been unsettling to see that radio hackers are interfering with police calls by sending hate messages, music, and even belches over radio frequencies designated for public safety use. If a crime victim were hurt or not provided timely law-enforcement service, such pranks could be deadly. Unfortunately, this type of mindless child's play is typical among some techno-nerds and cop-haters who have nothing better to do.

But what is even more disturbing than the actions of a few foolish hackers is the reaction to them by Orange County public agencies. According to the *Times*, officials there are "spending millions of dollars on a new radio system that will — among other features — encrypt police frequencies and better protect channels from invasion." Police departments in Irvine and Tustin are ready to begin using the encrypted system this month.

This is a sad chapter in public service agencies' attempts to prevent the rest of us from listening to what they are doing. For years, it has been possible for radio buffs to listen to police, fire, and emergency calls with the help of a scanner radio. It can be as simple as turning on the scanner and locking into a particular radio frequency.

Things have become a little more complicated with new technologies, but the basic beauty of scanner monitoring remains: U.S. residents can listen to those people charged with protecting their lives, liberty, and property. As citizens of this democracy, each of us has a right to listen to public safety workers whom we pay with our hard-earned tax dollars. They are accountable on our behalf. But by encrypting, or scrambling, their transmissions so that they are unintelligible, Orange County agencies are doing a disservice to local residents, not to mention setting a dangerous precedent for other cities and counties.

Upstanding public service operations should have nothing to hide. Imagine a country full of agencies that hide their communications from the very public they serve. Does it sound just slightly undemo-

cratic? Well, it is. This is not about cell-phone communications which the federal government has already blocked off for privacy reasons, but about something in which we all have a vested interest: how law enforcement watches over us, their accountability.

Of course, there are many people out there who couldn't care less about turning on a scanner and listening to their local police department; still, they have the ability to do so. Without that ability, they have no way to exercise their right to know what is happening. They are cut off.

Police in particular have had their share of public relations problems. Preventing the public from hearing what they are doing is only going to add to the tension. It would be harder for many to trust law enforcement officials who block their communications.

Their argument is that since anyone, including criminals, can hear such communications, agencies have a right to prevent their sometimes sensitive conversations from being intercepted. What if a burglar using a scanner were to hear an officer's position, thus enabling him to escape his pursuers? That is one possible scenario. But are such rare examples enough of a reason to prevent the majority of this society's law-abiding citizens from listening in? Criminals, like the hackers mentioned earlier, may already use sophisticated electronic equipment to find a way around signal encryption.

Who pays for all this privacy technology? Those of us who actually follow the law of the land. Our tax money ends up paying for public agencies that encrypt their communications systems. Why, one wonders, would a financially strapped institution like Orange County spend millions of dollars to prevent its responsible, law abiding citizens from hearing public communications. Is someone trying to hide something, or is this just foolish spending?

To my knowledge, adjacent public safety agencies have not gone down this route. Technology has changed local communications systems through the years, but not to the point of making it impossible to hear what the boys in blue are saying. And that is the way it should be. Noble police, fire, and rescue workers are out there putting their lives on the line every day. Should they ever decide to prevent residents from hearing their communications, we all must realize that something has gone terribly wrong.

We appreciate Chris Boyd sharing his editorial with us, and we invite your responses. Is scanner listening a right? A privilege? Or even a responsibility. We won't be the ones to ultimately decide the legal question, but we can have an influence. What we listen to, why we listen to it, and what we do with what we hear, WILL have an impact on how scanner owners are viewed by the very public safety agencies to which we listen.

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